Engineering Library
JUN 23 1924

Founded March 1, 1874—Fifty Years of Service

Electrical World

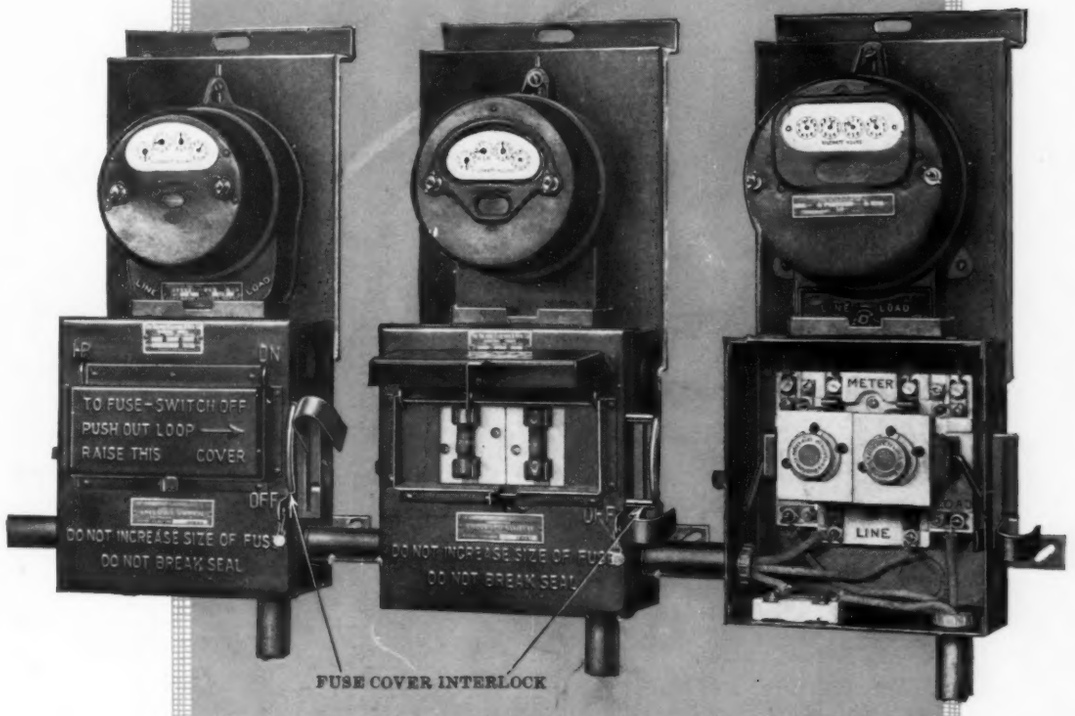
McGraw-Hill Company, Inc. Twenty-five Cents Per Copy

June 21, 1924

THE UNDERWRITERS' CLASSIFICATION AA SWITCH

—"protects the Utility interests and preserves the good will of the customer"—

The Palmer Universal Adapter standardizes the service for Duncan, General Electric, Sangamo, Sewickley and Westinghouse meters or serves as a blank end wall without any additional part.



PALMER UNIVERSAL SERVICE SWITCHES

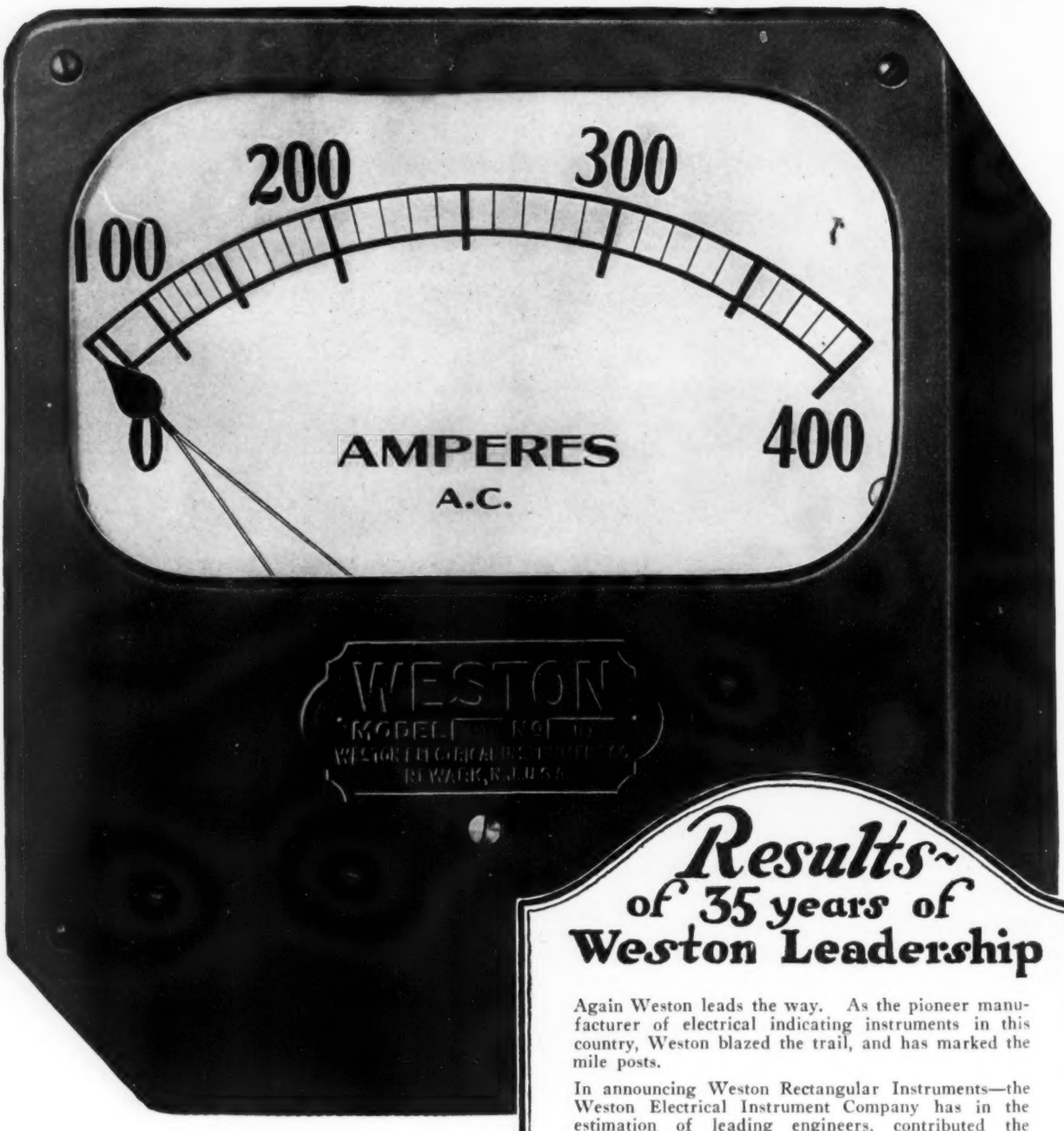
(*Underwriters' classification AA* 30-60-100 *and* 200 *amperes capacity*)

UTILITY company records prove that seal breakage is reduced over 80% where AA switches are used as compared with other approved switches of all other classifications, because, with AA switches the customer has instant access to the fuse for any legitimate purpose without breaking the seal, a fundamental service switch requirement.

THE PALMER ELECTRIC & MFG. CO.
Cambridge, Mass.

Electrical Indicating Instrument Authorities Since 1888

WESTON



Results~ of 35 years of Weston Leadership

Again Weston leads the way. As the pioneer manufacturer of electrical indicating instruments in this country, Weston blazed the trail, and has marked the mile posts.

In announcing Weston Rectangular Instruments—the Weston Electrical Instrument Company has in the estimation of leading engineers, contributed the greatest advance in the art of switchboard electrical indicating instruments for 15 years.

Space economy with the new rectangular instruments as compared with the old round pattern type on a four circuit panel, based on recent practice, is in the ratio of 5 to 9.

This is too important a fact for any electrical engineer or switchboard designer to pass by. We have accordingly prepared Bulletin 1504 particularly for you.

Write for your copy today.

Weston Electrical Instrument Co., 13 Weston Ave., Newark, N. J.

Electrical World

The consolidation of Electrical World, Electrical Engineer and American Electrician

Published by McGraw-Hill Company, Inc.

W. H. ONKEN, JR. Editor — HAROLD V. BOZELL Editor

Volume 83 — New York, Saturday, June 21, 1924 — *Number* 25

Advantages of Private Initiative and Enterprise Recognized

THE electric light and power industry of the United States, as is well known, by far exceeds in invested capital and output the electric industry of any other nation. While Americans accept this as a fact, they do not always appreciate that this is largely so because of private initiative and enterprise. A careful survey of conditions throughout the world reveals that wherever private enterprise has been permitted to exercise its genius unhampered, there progress has been made. If all the contributions made by government and governmental agencies toward the establishment or perfection of public utility service were noted in a book, the volume would be very small indeed. As a matter of fact, it would hardly reach the proportions of a volume—it would never be more than a pamphlet. The basis of America's greatness and growth is the genius of individual effort and enterprise, and the ELECTRICAL WORLD is glad to note that the platform of one of the great political parties recognizes and reaffirms this so far as public utilities are concerned.

"American industry," the platform reads, "should not be compelled to struggle against government competition. The right of the government to regulate, supervise and control public utilities and public interests we believe should be strengthened, but we are firmly opposed to the nationalization or government ownership of public utilities." On the subject of water power the same platform has this to say: "The federal water-power act establishes a national water-power policy, and the way has thereby opened for the greatest water-power development in history under conditions which preserve initiative of our people yet protect the public interests." To readers of the ELECTRICAL WORLD neither of these pronouncements is new doctrine, nor is it likely that either of them will be the crucial point upon which the next election will turn. Nevertheless, it is comforting to have the recognition and good to know that the industry has not labored in vain and that there is still some balm in Gilead.

What Water Power Has Meant to Canada

WITH the exception of one or two cities in the prairie provinces, the power needs of Canada from coast to coast are supplied from hydro-electric developments. Beginning with Quebec, nearly every large city on the route westward—Montreal, Ottawa, Toronto, Hamilton, St. Thomas, London, Port Arthur, Fort William, Winnipeg, Calgary, Vancouver and Victoria—relies on falling water for its light and power. Nor has nature been unkind in her allotment of streams to the country of the maple leaf, particularly in the provinces of Quebec and Ontario, where conditions are such that even the constant and mighty St. Lawrence is in cheapness of development put to shame by some of the lesser streams. Whatever may be the present status of the electrical industry in Canada under paternalistic governments, it was not the latter that led in harnessing the water powers. Privately owned companies did it and privately owned companies still set the pace.

In his address before the Canadian Electrical Association at Ottawa last week P. T. Davies showed that the per capita consumption of electricity in the Province of Quebec, where private initiative still holds sway, is 820 kw.-hr. a year. This is probably the highest in the world and certainly is the highest thus far established in the two Americas. Cheapness of development and consequent cheapness of electricity account for it. It is significant, however, that Ontario with the cheapest water power in the world at its command—Niagara Falls—does not approach the Quebec mark, although one would imagine that with a more fertile country, a better climate and an English-speaking population Ontario would surpass it. This indicates that, despite handicaps, private corporations are more than a match for governmentally owned systems. Industry has always shown confidence in the ability of the former to supply a more dependable and a cheaper service. Experience also has proved the inefficiency of government systems. Quebec's record merely corroborates history.

Much Yet to Be Done by Pittsburgh Utilities

THE public utility companies in the Pittsburgh district in 1921 produced two and one-half times the power per ton of coal that they did in 1911 and reached a greater advance in efficiency of operation and power production than the iron and steel industries. These striking statements by the authors of the notable study of power in the Pittsburgh district published in this issue show once more indisputable evidence that economic pressure is toward the greater use of power produced by large and efficient units.

Another striking assertion is to the effect that the power used in mercantile establishments such as retail stores is 12 per cent of the total utility power used and greater than the power used for domestic consumers and street lighting combined; and in spite of the use of 53 per cent of the total power for industrial purposes the authors maintain that preliminary studies show that the industries themselves, exclusive of the iron and steel group, produce several times the amount of power produced by the utilities.

The surface is only scratched from the standpoint of the central stations, which produced a billion kilowatt-hours in 1921, for the iron and steel industry alone produced the equivalent of eight billion kilowatt-hours and other industries the equivalent of several times this figure. This is an encouraging outlook for the central-

station companies in the district, and they are awake to the situation. Interconnections, new stations and new business are following fast. Every nerve has been strained to handle the existing load and to increase business, for peak loads have increased 100 per cent since 1916 and the generated power has increased 200 per cent since 1915.

The study shows that the utility companies have done a good job in the district, but yet have the opportunity of building to a power load that fairly staggers the imagination. The increased use of interconnection and of larger units and stations will give the utilities still greater advantages for the production of power more economically than any other agency, while the greater diversity of use will gradually lower the peaks and lower the investment costs per unit of power produced.

Mr. Millar Outlines Problems in Street-Lighting Development

DEFINITE objectives for research and development in any phase of the electrical art are formulated with difficulty and are seldom published. Yet in many ways a digested summary of developments and an outline of things yet to be done are constructive and essential elements to rapid progress. It is fortunate, therefore, that the subject of street lighting has received this treatment at the hands of Preston S. Millar in a paper to be presented at the June A. I. E. E. convention and which is published in the June issue of the *A. I. E. E. Journal*. In this paper it is asserted that the purposes of street illumination are, first, to reveal and, second, to embellish, and that all other considerations are subordinate. On this basis the art is summarized and definite statements are made regarding further developments.

It is said there is no generally accepted criterion of effectiveness in street lighting. Definite test methods are not available and no tests are made. It seems that effectiveness in street lighting, like personal charm, is recognized when encountered but is difficult to define or measure. Moreover, the relationship between candlepower and brightness of source and the relationship of these to location and background in street lighting are not well understood. These effects should be measured and evaluated in a manner which will entirely eliminate the subjective element or at least bring it under control.

After enunciating these technical objectives, the paper then indicates some commercial goals to be reached. The average per capita expenditure of 75 cents for street lighting in American cities should, in the opinion of Mr. Millar, be increased to $1.75, and there should be a greater uniformity in system designs, even though this may influence the element of distinctiveness, which also deserves consideration. Further, a nearer approach to unanimity of opinion and practice should exist in regard to suitable standards of illumination to be used in the different types of streets, and there should be a real survey of the existing lamp equipment in order to reduce the number of types and obtain the best designs for the different requirements of illumination.

Thus definite technical and commercial problems which should receive serious consideration are stated, and the open forum at the convention should serve to bring out very constructive discussion of this important subject.

The Central-Station Company as a Merchandising Standard Bearer

WHILE the ELECTRICAL WORLD'S investigation as to who is selling electrical appliances shows that an increasing number of non-electrical merchants have been attracted to the business, this condition does not indicate that the central-station company has become a less important factor in the retail distribution of electrical devices. Rather, this multiplicity of dealers selling appliances puts a still greater responsibility on the central-station company. Staple and well-established devices are being sold on a competitive basis which, on the whole, will result in a larger total volume of business by all dealers and will benefit the manufacturer, jobber and retailer alike.

But non-electrical dealers sell only the appliances on which they can make a direct profit. So, in order to get a balanced use of all devices in the homes of its customers, the central station needs to carry on a high-class merchandising activity of its own and set the pace for all other dealers. When it comes to creative sales effort on pioneer devices requiring a considerable period of missionary work, the responsibility rests wholly with the central-station company, backed up by the manufacturers. No other retail dealer will put forth this effort, and the department stores in particular frankly state that they do not intend to handle refrigerators, ranges or any other of the larger appliances until they are well past the development stage. The central stations cannot and should not try to escape their duty as pioneers. The only question is how far they are willing to go with this work and how fast they can bring it to the desired stage.

Standard Control Equipment Should Be Used

MANY electrical engineers of industrial plants have their own ideas as to the peculiar features that the control equipment they purchase should possess. In the case of some industrial plants special conditions exist requiring control that is not standard, but in the majority of cases there is usually a sufficient variety of standard apparatus on the market to fill requirements. What the engineer does not realize is that when he draws up elaborate specifications for control apparatus he adds probably 50 per cent to the cost of the equipment to his client, and that in some cases where, for instance, the hand-starting equipment may cost from $15 to $20 the various accessories and special work called for may run the cost up to several hundred dollars—an economically unjustifiable procedure. From the standpoint of the manufacturer special apparatus is always less profitable than standard apparatus, almost regardless of selling price. It is nearly impossible to estimate the additional cost of manufacture. The extra expense extends all the way from the branch office to the sales department, the engineering department, factory clerical work, additional superintendence and inspection and, finally, extra cost of testing and packing.

It is not intended that the engineer should abolish specifications on control equipment, nor should he make them too general, as this would result in the lowest-priced apparatus being furnished. What the engineer should do, in the interest of his client or his plant, is to select what he considers to be the best standard control equipment for his particular job and then draw his

specifications so that he will be sure to obtain that particular apparatus. It is, of course, necessary for the engineer to have confidence that the manufacturer so favored by the specifications will operate on a one-price policy. Electrical engineers who determine the equipment that should go in industrial plants are showing an increasing willingness to accept the controller manufacturers' standards, but there is still room for further progress in this direction.

Engineers and Educators Have the "Will" but Not the "How"

ENGINEERING education is a topic that arouses interest and creates unending debates. Each national engineering society has an educational committee, and joint committees of educators and engineers are frequently encountered in the industry. Investigations, researches and symposiums on the subject abound in the annals of engineering. A study of conditions as a whole indicates that many misconceptions exist between educators and practicing engineers because of a lack of mutual understanding of the objects, work and limitations of the two fields of endeavor. A criticism often heard is that educators teach theory only and are out of touch with practice, and in turn the educators say that fundamentals are the essential thing and that engineers should not expect a finished product from the schools. An infinite variety of debatable subjects is always available, and the frequency of the debates that result has produced volumes of recorded speeches. But there has been little constructive action because there has been no mechanism available for bringing engineers and engineering educators into contact in the ways conducive to progress and mutual understanding.

All over the country the school laboratories lie idle during the summer, and yet a very large number of instructors would welcome with eagerness an opportunity to take the laboratory facilities and work out practical research problems submitted by engineers in practice. All over the country in the industry are organizations wrestling with problems that have arisen on their properties whose solution could be obtained through the expert theoretical knowledge of the college professor. All over the country young engineers in industry desire to do some research and post-graduate work in the schools for a period, and in turn young teachers desire to work in the field for a period. Moreover, educators desire engineers to speak to their students and introduce to them the practical engineering atmosphere and attitude.

There is in the hearts of both the engineers and the teachers an unselfish and eager desire to be of service and to co-operate. There is no great financial handicap because proverbially both engineers and teachers require work and not money to be happy. What is needed is the contact and the mechanism of a clearing house. Perhaps an active joint committee could do something constructive in finding a way to put teachers in industry during the summer, put college laboratories and their staffs to work, interchange engineers and teachers for short periods of time, make available more engineers as lecturers in the schools, get teachers to participate actively as consultants on industry problems and thus bring about that intimate contact and understanding that will result in mutual respect and helpfulness.

The will to do this sort of thing exists and only the mechanism is needed to produce one of the most potent influences to advance the engineering art.

High-Range Electrostatic Voltmeter

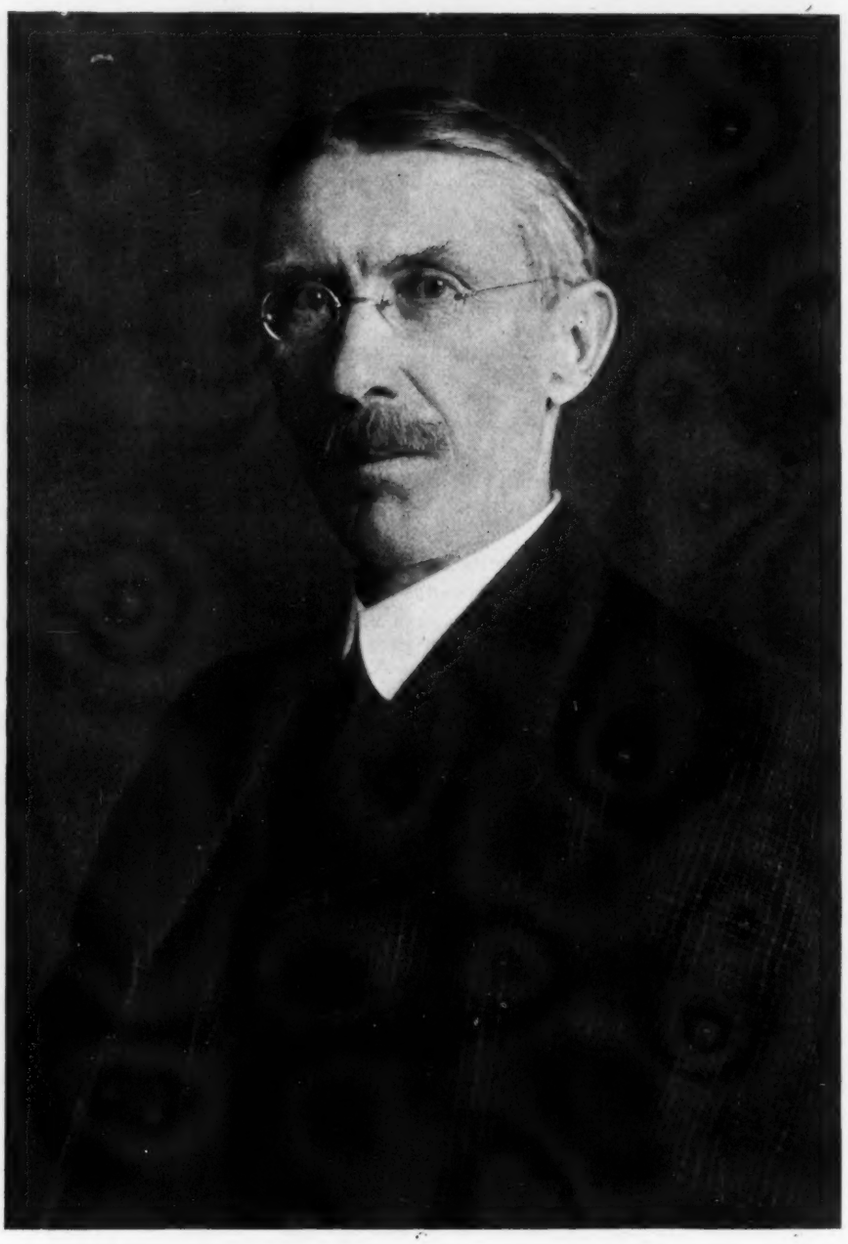
THE use of the force of attraction between the opposite plates of a condenser has long been recognized as a very desirable principle for a measuring instrument. The current taken by such an instrument is zero under continuous voltage and is wattless and of small value under alternating voltage. The serious limitation of such instruments has always lain in the fact that they must be entirely screened from outside electrostatic influence, since their moving parts are not in fixed relation to the fixed parts and the two are separated by greater or less air space. For these reasons satisfactory instruments of this type have been confined to relatively low ranges, in which the dimensions of the active parts are not so large as to preclude complete inclosure, while at the same time maintaining the portable feature. A number of forms of high-range instruments have been devised, but in practically every case the instrument must be operated with one terminal grounded, and the calibration is subject to variation as affected by surrounding conditions.

Two new and interesting modifications of the electrostatic principle, for direct-reading instruments up to 250 kv., have recently been announced; and for each of these there is claimed permanent calibration independent of surrounding objects and for either of the conditions—one terminal grounded or both terminals insulated. In each the indicating instrument is the usual type of quadrant electrostatic voltmeter, with direct-reading scale of low range, placed in series with a carefully screened air condenser which takes up the greater part of the total potential difference. In the first, by A. Imhof, described in a recent number of the *Bulletin Schweizerischer Elektrotechnischer Verein*, a cylindrical air condenser is completely inclosed in an outside metallic housing, and connection is made between the outer member of this cylindrical condenser and the recording instrument on the outside, through a suitable insulating bushing. The voltage rating is considerably increased by surrounding the inner member of the condenser with a thin layer of insulating material of high dielectric strength.

Of somewhat greater interest is the instrument of K. A. Sterzel, described in *Elektrotechnische Zeitschrift* for February 14. In this case the recording instrument is completely inclosed in a metal sphere and its pointer projects through a narrow slit, working over a horizontal scale marked on the surface of the sphere. This sphere is placed concentrically between two outer concave spherical surfaces forming the two terminals of the instrument. Similar circular disks at opposite ends of a diameter are cut in the surface of the inner sphere and insulated therefrom. These form the terminals on the inclosed recording instrument. The capacity between these disks and the outer spherical members is apparently free from outside disturbance when the angular embrace of each outer concave electrode is 90 deg. The range of the instrument may be varied either by increasing the size and distance of separation of the outer spherical terminals, or within certain limits by varying the separation of these members. The calibrations are shown to be identical for one terminal grounded and for both terminals insulated, and in each case over a range from 50 cycles to 500 cycles. It has been constructed for ranges up to 250 kv. The size of the meters is the most objectionable feature.

William James Foster

A design engineer of the highest rank whose influence has been powerful in the development of alternating-current machinery.



IN THE process of developing electrical and magnetic design there are at least three rigid requirements demanded of an engineer: He must possess a sound technical training, a historical knowledge of the details of development and their significant consequences, and last, a personality and type of mind which will permit a definite execution of this knowledge.

William J. Foster, consulting engineer of the General Electric Company, has been intimately concerned for the past thirty years with the design of alternating-current apparatus. It may be truthfully said that he is one of the most popular consulting engineers in the company, and outside of it, in the huge electrical field. Such work as Mr. Foster does can best be accomplished through the long association and mutual confidence of men who have learned to understand each other and who can successfully combine efforts and knowledge. A quick, original mind, well stored with details of design and their importance, has given him a rare gift as engineer and counselor. He holds individually several patents which are important, and directly or indirectly he has been responsible for all of the large alternating-current apparatus that the General Electric Company has ever built. His assistance and encouragement to other engineers less versed in knowledge and experience have made him a well-known and highly respected figure.

Mr. Foster was born in Argyle, N. Y. He received his A.B. from Williams in 1884, his A.M. in 1887, and an M.S. from Cornell, where he specialized in physics and electrical engineering, in 1891. For some years he was an instructor in physics and chemistry at Hill School, Pottstown, Pa. This experience and training were of immeasurable aid as a training in transmitting ideas.

In the early days of experimentation and development work on direct-current generator design, and also on synchronous converters and induction motors, Mr. Foster worked with the Thomson-Houston Company, where he became associated with H. G. Reist. Since 1892 these two men have worked side by side, aiding the industry and growing with it.

Kindliness and modesty are dominant forces in Mr. Foster's character. The habit of constant work and a delightful sense of humor have been powerful influences in his life. A personality which inspires confidence while free from egotistic assertion has given him a peculiar faculty of co-operating with others.

Electric Power in Pittsburgh District

Analysis of Central-Station Power Production Over a Period of Years—Detailed Data on Division of Load, Outputs, Peak Demands and Future Trends—Comparison with Other Power Sources

By WALTER F. RITTMAN and SUMNER B. ELY

Professors of Commercial Engineering Carnegie Institute of Technology and Consulting Engineers to the Pennsylvania Giant Power Survey

THE Carnegie Institute of Technology through its commercial engineering department is conducting a major investigation of present power requirements and potential power possibilities in the Pittsburgh district, (1) with relation to the community and its development as a whole and (2) with relation to the various specific industries of the community. In a previous article (*Journal of the American Society of Mechanical Engineers*, 1923, page 401) the authors presented data covering power and fuel consumption of the iron and steel industries of the Pittsburgh district.

The data presented showed two marked developments in the power phase of the iron and steel industry—first, the increased load carried by each unit of physical equipment and, second, the marked increase in cost of fuel for the development of power.

The study showed further that if the total steam produced by the iron and steel industry were converted into electrical energy, this power would be equivalent to approximately two-thirds of the total industrial power comprehended in the Superpower Survey for the entire region between Boston and Washington, published a few years ago by W. S. Murray and others. In other words, during the year 1920 the boiler-horsepower hours for the iron and steel industry of the Pittsburgh district reached a figure approximating 4,100,000,000, which would be equivalent to approximately 8,500,000,000 kw.-hr. (using 16,000 B.t.u. as a factor for converting steam into equivalent kilowatt-hours), whereas the Superpower Survey finds that the total industrial load over the entire district comprehended for the same year was between twelve and thirteen billion kilowatt-hours, of which approximately 75 per cent was developed by the industries themselves and 25 per cent was purchased by the industries from public utilities.

NEXT in general interest to the power and fuel consumption of the iron and steel industries of the Pittsburgh district is that of the central stations of the district. Despite the increase from 400,000,000 kw.-hr. in 1914 to approximately 1,200,000,000 kw.-hr. in 1920 developed by the central stations of the district, the total energy of the central stations at the time this survey was made amounted to approximately 25 per cent of the power of the iron and steel industry of the district. This brings out in rather striking fashion the relative amount of power required by a metallurgical industrial process such as steel making as contrasted with the total requirements of public utilities and small industries consuming electrical energy in mechanical work. It was found, however, that the central-station service of the district has advanced in efficiency of operation and power development from a given amount of coal to a greater extent than the iron and steel industry.

In the present study, the procedure for obtaining correct and usable data was given much thought and attention. Different industries or institutions keep books differently, and to be comparable or even capable of summation the figures from different institutions must be in common units. In the case of the central-station service power study a happy solution was found. The Pittsburgh district power requirements are served by two major public utility corporations, the Duquesne Light Company and the West Penn Power Company. A committee composed of engineers of these two companies together with the authors, sitting in conference, found no difficulty in coming to a common basis of expression. No detailed figures for either company are given; all figures are summation figures for the district and deal with the district as a consumer of central-station service rather than with either or both of the companies as distributors of power.

The period covered by the study included the important period from 1915 to 1922. The study is concerned primarily with the actual power figures since 1914; still, a projection of the curves indicating the probable minimum requirements of the next few years has been made. The projections into the future are thoroughly conservative, possibly too much so, because they are based on the assumption that the amount of increase over the projected period of years will be equal only to the absolute amount of such increase for the just preceding corresponding numbers of years. In addition to total volume figures, the study is concerned with such important phases as variations in load during the different hours of the day, on the different days of the week and the different months of the year. It was further considered important to make a detailed analysis and exposition of the various percentages of the total central-station power which is used for street lighting, for domestic service, for mercantile purposes, for street railways and for industry. It further was of fundamental interest to make an analysis and exposition of the change in efficiency of public utility power. This is shown in the kilowatt-hours derived from a ton of coal from year to year during the period under observation. It is felt that a study, from both the detailed and the comprehensive viewpoint, of the power requirements and development of a region as important as the Pittsburgh district will serve as a help or barometer for other centers.

DEFINING THE PITTSBURGH DISTRICT

The area selected for the purposes of this power study is comprised within a 30-mile radius with the Pittsburgh City-County Building as the center. This area, rather than the corporate limits of the city, was used because the industrial institutions and the people within these limits consider themselves as part of indus-

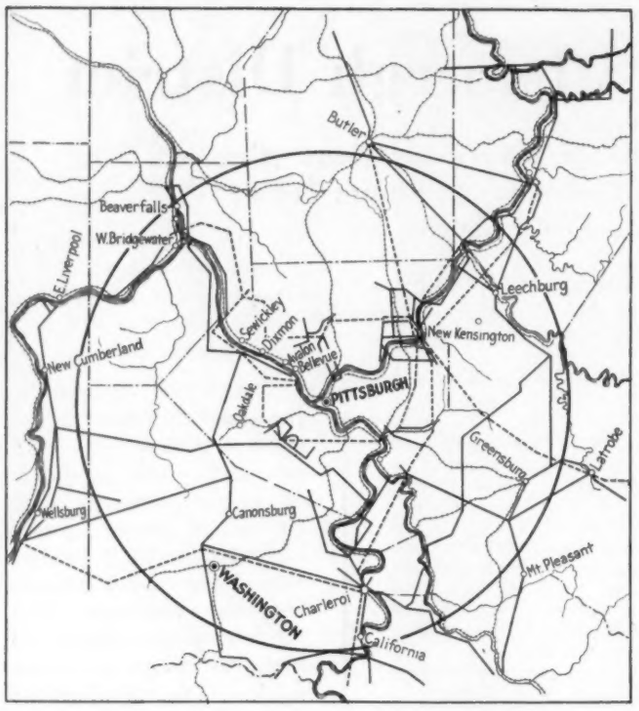


FIG. 1—AREA COVERED IN POWER STUDY, SHOWING TRANSMISSION SYSTEMS AVAILABLE

CENTRAL-STATION SERVICE AVAILABLE IN THE PITTSBURGH DISTRICT (1921)

	Capacity, Kw.		Capacity, Kw.
Colfax	60,000	Phipps	2,250
Brunot's Island	119,500	Springdale	42,000
Rankin	11,000	Windsor	30,000
Glenwood	5,800	Connellsville	56,500
Twentieth Street	6,400	Small stations	2,805
Thirteenth Street	8,000		
		Total	344,255

trial Pittsburgh fully as much as the institutions and people within the narrowly restricted corporate limits.

Fig. 1 shows the area which is embraced in this study and situated within a radius of 30 miles from the city's center. The figure furthermore shows the various trunk lines within the district used for electrical transmission. In Fig. 1 no transmission lines are shown whose voltage is less than 22,000.

A transmission power ring has been built around the area in this district where population and industries are most concentrated. A larger or outer ring to give the same flexibility of distribution over the whole area is in process, sections being built as rapidly as conditions warrant.

It will be noticed that a number of transmission lines run outside of the 30-mile radius circle and make connection with other districts. Some energy is sent into the Pittsburgh district, and in cases of emergency these connnections are of great importance to Pittsburgh. Due allowance for any power sent in or out of the district has been made, however, in the data and curves developed. Load figures have been carefully estimated based on actual percentages, and it is believed that they are as near the actual figures as it is possible to estimate.

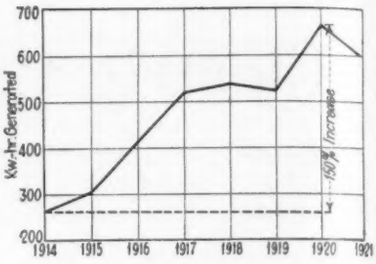


FIG. 2 — CENTRAL-STATION ENERGY GENERATED IN KILOWATT-HOURS PER CAPITA USED FOR INDUSTRIAL AND DOMESTIC SERVICE IN THE PITTSBURGH DISTRICT. AN INCREASE OF 150 PER CENT SINCE 1914.

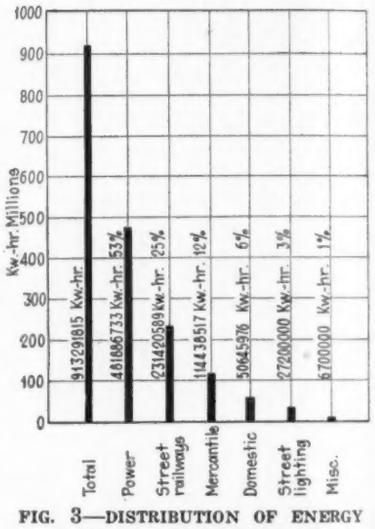
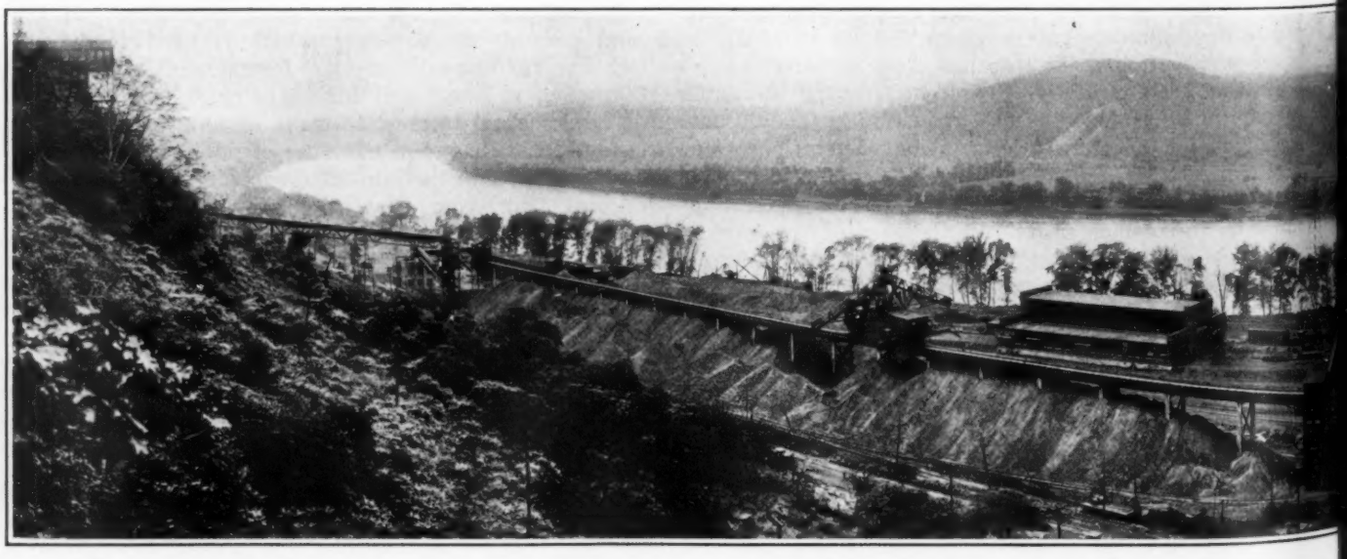


FIG. 3—DISTRIBUTION OF ENERGY SOLD IN THE PITTSBURGH DISTRICT IN 1921

The total rated capacity of all the plants of the central-station companies amounts to 344,255 kw. and is as shown in the accompanying table. Though the entire 344,255 kw. capacity was in direct communication with the Pittsburgh district, only 254,950 kw. was operated primarily for the district. In other words, the plants at Windsor and Connellsville and



MORE THAN 180,000 KW. IS IN THE WINDSOR STATION OF THE

smaller plants were operated for service both inside and outside of the 30-mile radius.

The increase of kilowatt-hours of central-station service per capita from 1914 to 1921 is shown in Fig. 2, indicating an increase of 150 per cent during the period. In other words, the people of the Pittsburgh District in 1921 were using two and a half times as much central-station power per person as they were using in 1914. It should be noted that this figure refers only to central-station power of the "public utilities." The iron and steel industry in the Pittsburgh district uses relatively little purchased power. On the other hand, it will be shown that more than half of this "public utility" power is used as industrial power.

A detailed analysis of the purposes for which "public utility" power was used in the Pittsburgh district during 1921 is contained in Fig. 3. The chart has been developed on the basis of power actually delivered to the consumer and is not based on power developed at the generating plant, transformer, line and other losses accounting for any difference between the total of this chart and the total shown in Fig. 8. It is rather an old story to electrical engineers, though often a very new story for those outside of the profession, that domestic and street lighting bear such a small relation to the volume of public utility power sold for industrial purposes. In the Pittsburgh district domestic power consumes only about 6 per cent of the total public utility power and street lighting only about 3 per cent. One is rather impressed by the fact that mercantile power, which is that power used for lighting stores and shops for the retail distribution of merchandise, should constitute a volume which is substantially twice that used for domestic purposes. The relation between illumination density and volume of sales per square yard of retail-store floor space constitutes yet another study, but suffice it to say that the present study has shown for the period a marked increase in the quantity of public utility power used in the mercantile establishments of the Pittsburgh district. It will probably be found that the volume of power used for street-railway service in this district is relatively higher than in most other centers, when compared on a traffic density basis. This is because of the density of population and the topography of the district covered. In any event substantially one-quarter

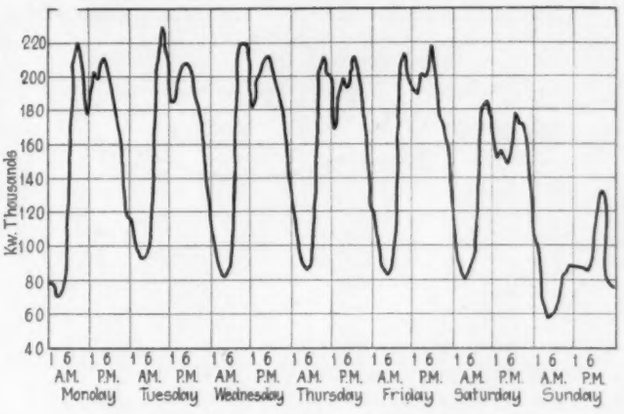

Kw. Thousands
220
200
180
160
140
120
100
80
60
40
1 6 1 6 1 6 1 6 1 6 1 6 1 6 1 6 1 6 1 6 1 6 1 6 1 6
A.M. P.M. A.M. P.M. A.M. P.M. A.M. P.M. A.M. P.M. A.M. P.M. A.M. P.M.
Monday Tuesday Wednesday Thursday Friday Saturday Sunday

FIG. 4—A TYPICAL WINTER WEEKLY LOAD CURVE IN THE PITTSBURGH DISTRICT

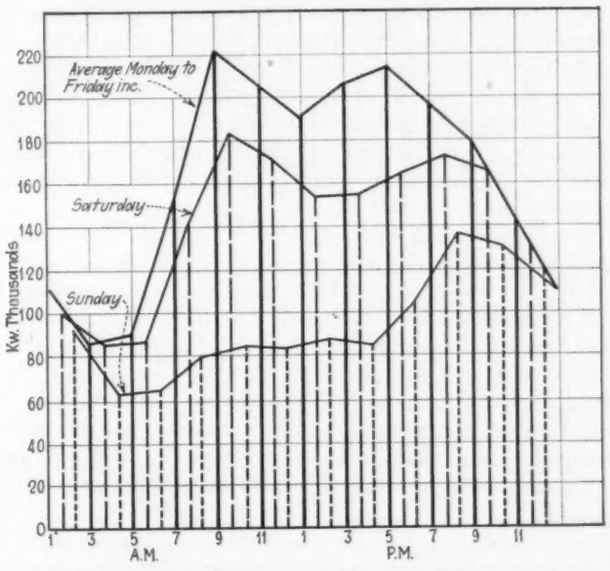
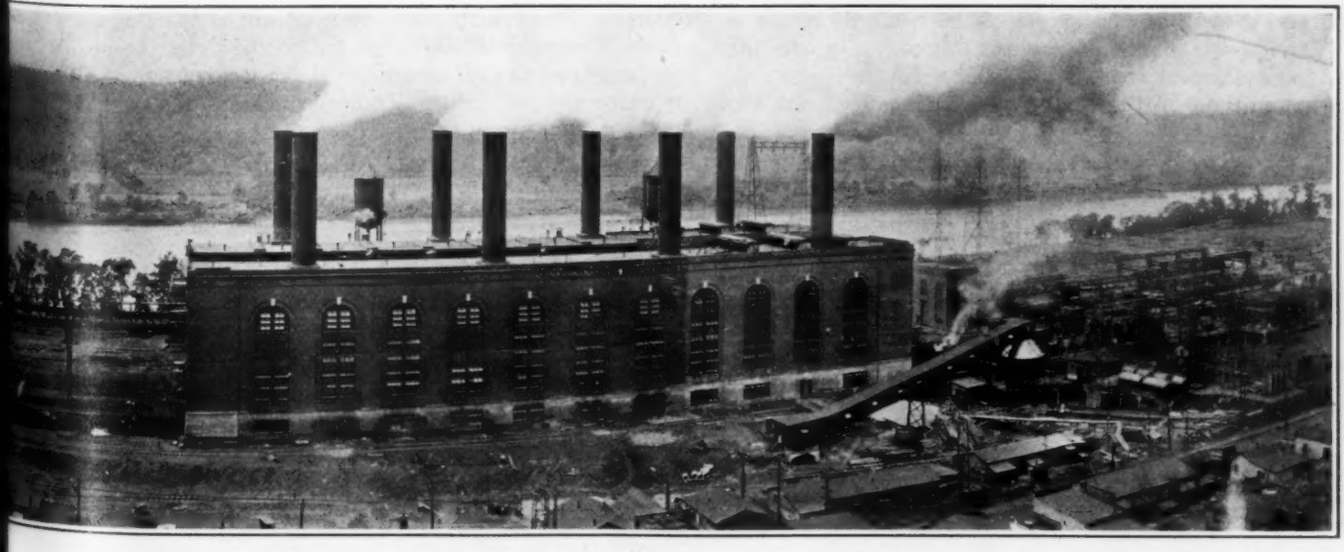


FIG. 5—HOURLY VARIATIONS IN A TYPICAL WEEKLY LOAD CURVE IN THE PITTSBURGH DISTRICT, BASED ON THE AVERAGE TWENTY-FOUR-HOUR LOADS

of the public utility power generated in the district is used in moving, lighting and heating street cars. In 1921 53 per cent of public utility power generated in the Pittsburgh district was used in industrial manufacturing operations.



WEST PENN POWER COMPANY AND THE AMERICAN GAS & ELECTRIC COMPANY

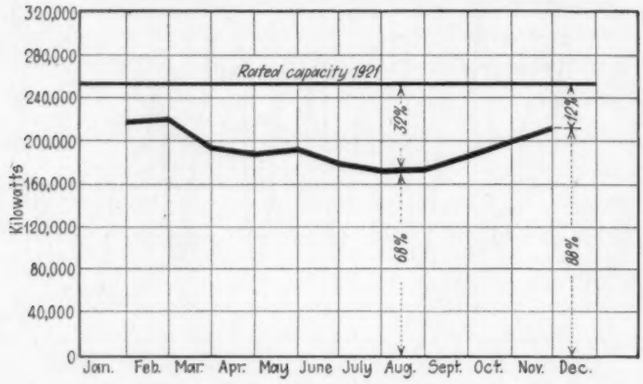


FIG. 6—MONTH-TO-MONTH VARIATION IN GENERATED LOAD IN THE PITTSBURGH DISTRICT

A typical weekly generator load curve is shown in Fig. 4. As would be expected, there is a daily peak in the morning except on Sunday, and the daily afternoon peaks have a tendency to be a little less than the morning peaks. Perhaps the morning rush is more concentrated and not distributed over so long a period as the afternoon "rush hours." The minimum load occurs naturally on Sunday morning. Tuesday is usually the peak day load for the week.

A more detailed exposition of the facts covered by Fig. 4, showing the hour-to-hour variations, is given in Fig. 5. The first five days of the week are averaged, and superimposed thereon are the loads for Saturday and Sunday. During the five days from Monday to Friday inclusive the variation in load is from approximately 80,000 kw. to approximately 220,000 kw., a variation of approximately 175 per cent. It is interesting to note that total fluctuation, as well as the maximum load, is smaller for Sunday than any other weekday.

The seasonal or month-to-month variations in public-utility-generated load in the Pittsburgh district during the year 1921 are shown in Fig. 6, which has been developed for the year 1921 because the abnormal business conditions of that year did not require the normal growth in power output and it is possible to present a seasonal variation chart with normal expansion eliminated. The year 1921 was abnormal in that the output of public utility power in the Pittsburgh district at the end of the year was virtually no greater than at the beginning of the year, whereas there is a normal growth of approximately 15 per cent.

During the month of August substantially one-third of the equipment was idle. Even so, however, the order of magnitude of the seasonal variation does not compare with the order of magnitude of day and night fluctuation.

The hourly peak loads of the public utility power plants of the Pittsburgh district during the years from 1916 to 1922 are shown in Fig. 7. From 1916 to 1922 the average hourly peak load shows an increase of 100 per cent. During the first four years from 1916 to 1919, inclusive, the rate of rise of hourly peak load was abrupt because of war requirements, with a relatively slow rate during the subsequent two years. It is believed, however, that the absolute amount of increase in hourly peak load during the six years subsequent to 1922 will be equal to the increase during the prior six years, and projection is made accordingly. The curve is not projected on the basis of a rate of increase greater than the prior six years, and accordingly it can be considered very conservative. Even so, however, it indicates a minimum hourly peak load of 360,000 kw. by 1928 for the district under consideration. In any event conditions since 1921 easily bear out the conclusions just expressed; moreover, the companies of the district are increasing facilities in excess of the requirements indicated. The generated kilowatt-hour output of the central power stations of the Pittsburgh district from 1915 to 1922 inclusive is shown in Fig. 8. The hourly peak curve of Fig. 7 shows substantially the same order of increase as the total output curve of Fig. 8. In the case of this curve the projection into the future has, like the curve in Fig. 7, been extended by drawing the projection through the lowest points. During the period from 1915 to 1922 the volume of generated power increased nearly 200 per cent. Because of this order of increase all power plants now in process of building as well as plans for future building contemplate the use of very large units installed at strategic centers. For example, the Colfax plant of the Duquesne Light Company is built adjacent to the outlet from the coal mine so that a minimum of transportation of fuel is necessary and continuity of service assured. All the

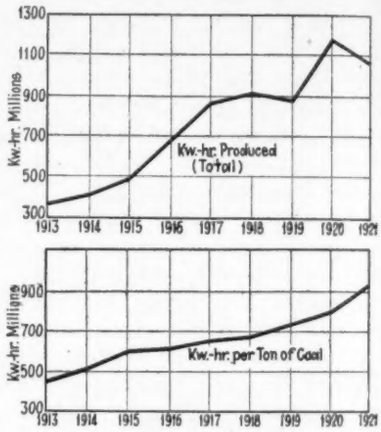


FIG. 9 — INCREASED ECONOMY ACCOMPANIES INCREASED OUTPUTS

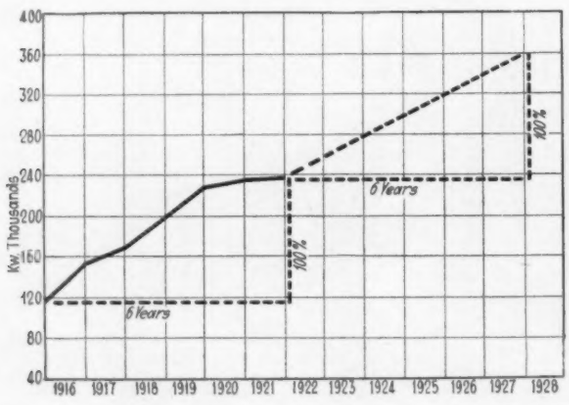


FIG. 7—HOURLY PEAK LOADS IN THE PITTSBURGH DISTRICT SHOW AN INCREASE OF 100 PER CENT SINCE 1916

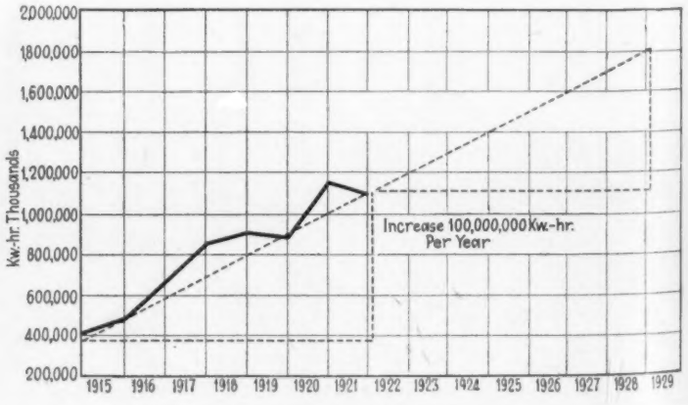
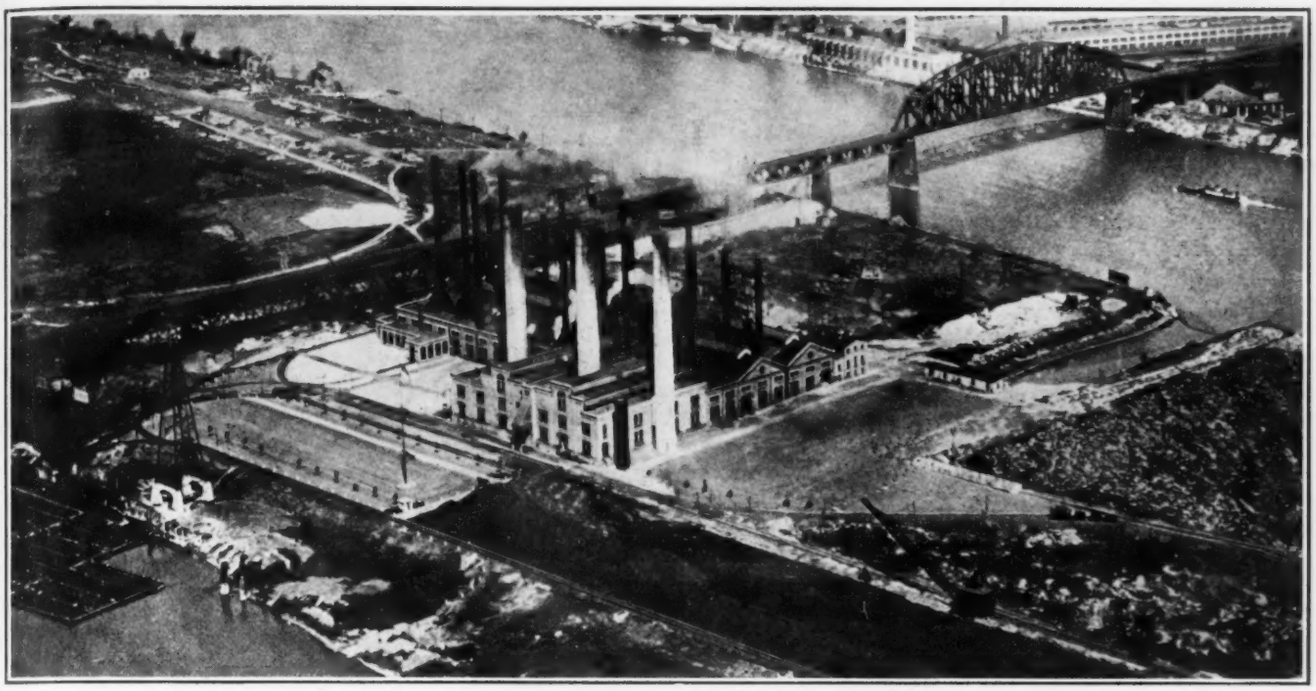


FIG. 8—GENERATED OUTPUT OF UTILITY POWER STATIONS IN THE PITTSBURGH DISTRICT

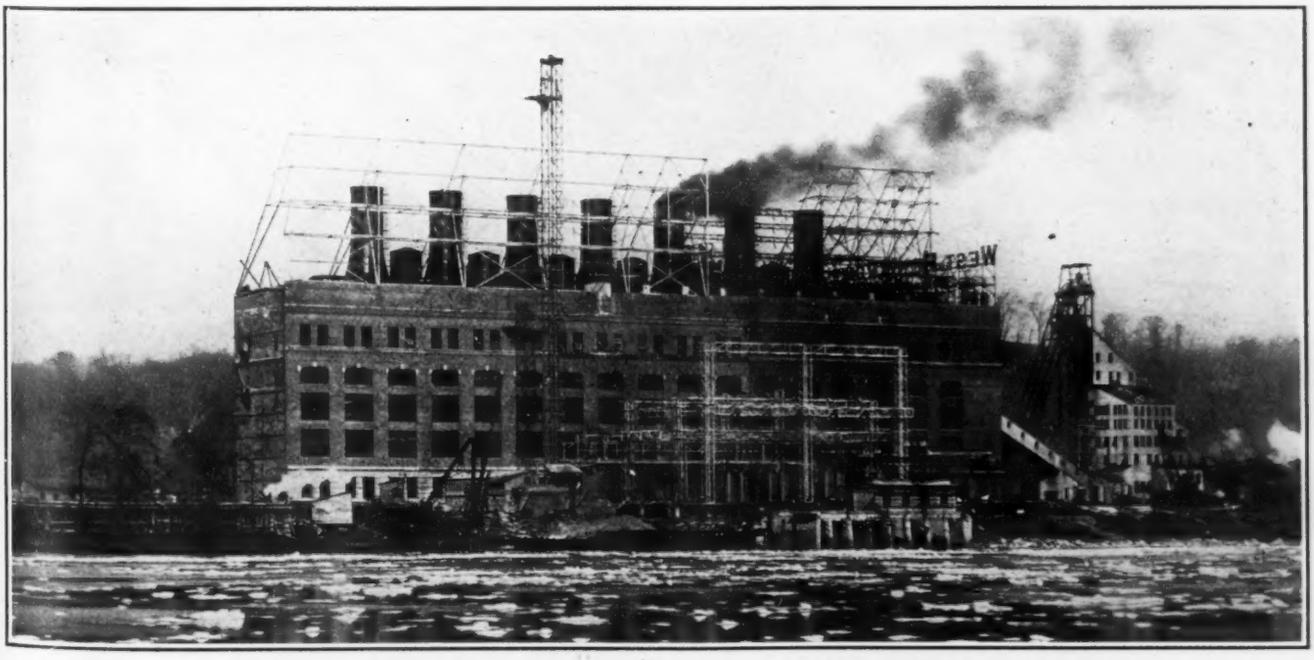


BRUNOT'S ISLAND STATION OF THE DUQUESNE LIGHT COMPANY, CAPACITY 119,500 KW.

units are of large capacity, being three-element compound Westinghouse turbines of 60,000 kw. rating, or two 30,000-kw. turbines each feeding into a 60,000-kw. transformer bank. At the present time (1924) the third 60,000-kw. unit is being installed and provision has been made at this plant for the addition of two more as needed. The Springdale plant of the West Penn Power Company is similarly being equipped with large units. In this plant there are now two 20,000-kw. units; two 30,000-kw. units similar to those of the Colfax plant are being installed, and future additions will probably be units of still larger size.

The curve in the lower part of Fig. 9 shows the progressive increase in the number of kilowatt-hours derived from a ton of coal during the period from 1913 to 1921. In round numbers, the central-station power plants of the Pittsburgh district today are getting two and a half times as many kilowatt-hours from a ton of coal as they did ten years ago. In connection with this large increase in efficiency a word of explanation is necessary. Two major factors have brought about this order of change. The substitution of the turbine for other machines was of fundamental importance, but of even greater importance has been the substitution of efficient large-unit-capacity plants, economically located with relation to fuel and water, for a summation of small isolated plants from our present viewpoint uneconomically located. It must be remembered that the Pittsburgh district contains in abundance the two items most necessary to the production of power, coal and water.

The increase in total kilowatt-hours produced during



SPRINGDALE STATION OF THE WEST PENN POWER COMPANY HAS A CAPACITY OF 112,000 KW.

the period is also shown in Fig. 9. The two curves are presented on the one chart in order that they may be studied one with relation to the other. While the order of increase is comparable, the efficiency does not vary uniformly with the changes in volume output. In other words, the improvements in efficiency are primarily a function of the installations. Of course, large unit installations are possible only when large output is required.

In presenting these data covering public utility power in the Pittsburgh district the authors prefer to leave to the reader any recommendations or criticisms of what is being done. No "program" is recommended or even suggested. Those responsible for the development of public utility power in the Pittsburgh district are fully aware of the possibilities of the situation. Formal arrangements have been announced and actual connections made whereby all of western Pennsylvania and eastern Ohio and considerable parts of West Virginia and Maryland are in position to exchange or pool public utility power for the common good and the protection of all citizens in the vast area affected.

The plan of the authors at this time is to develop comprehensive and intensive data covering all the power of the Pittsburgh District exclusive of railway and automotive transportation. This broadly divides itself into power of the iron and steel industries, central-station or public utility power and industrial power exclusive of that used in the iron and steel industry. Preliminary figures show this last item to be several times larger than the public utility power covered by this report. It may later become the plan of the authors to assist in working up a comparative balance sheet of all the power elements affecting power in the Pittsburgh district, with the view, possibly, of developing a form of co-operation or co-ordination in terms of equipment or of product, which in this case is power, to the mutual advantage of all.

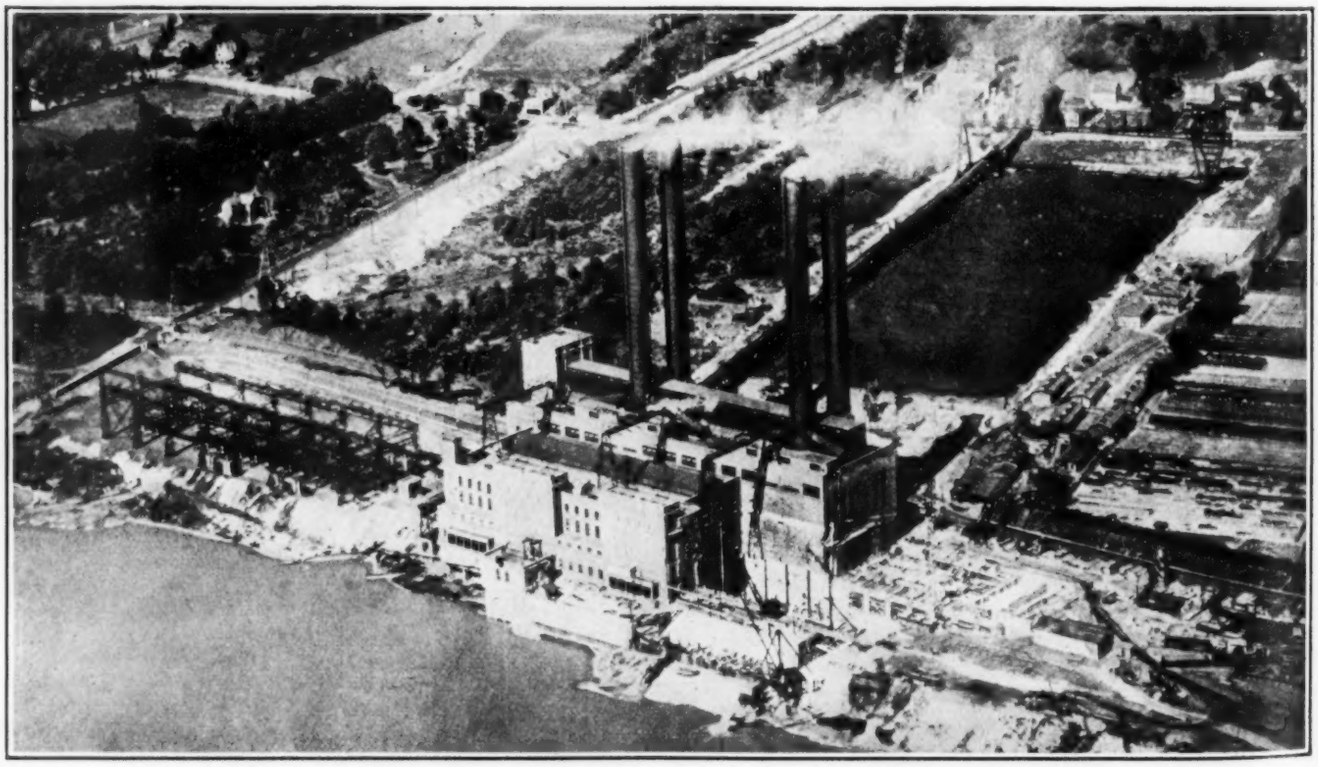
International Critical Tables

AT THE meeting of the International Union of Pure and Applied Chemistry held in London in 1919 the American delegates submitted a plan for the international compilation of a set of volumes of critically prepared tables of the physical and chemical properties of materials of importance to the pure scientist and the engineer. This plan received the approval of the union at that meeting and later received also the support of the International Research Council.

According to the proposal submitted by the American delegates and approved by the union, America, through its National Research Council, has undertaken the entire financial and editorial supervision and sponsorship for the project. The financial responsibility is vested in a board of trustees and the editorial responsibility in a board of editors. The work of critically examining the data and of compiling the various tables is being carried out by several hundred experts chosen from various countries of the world.

The whole work is unique in its large scope and should prove of great value to all those who need authoritative data on physical and chemical properties of various materials. Among topics of interest to the electrical industry are the following: Alloys, abrasives, refractory materials, electrical porcelain, glasses, enamels, thermal insulating materials, rubber, carbon, mica, oils, asphalts, lubricants, fuels, resins, textiles, adhesives, papers, paints, varnishes, etc. There is besides an extensive section on electricity and magnetism, with various physical constants.

The expense involved has been mostly provided for by private subscriptions, and it is hoped to issue the volumes at a reasonable price. It is expected that the actual publication will begin in 1925. The editor-in-chief is Dr. E. W. Washburn, National Research Council, Washington, D. C.



COLFAX STATION OF THE DUQUESNE LIGHT COMPANY HAS A CAPACITY OF 180,000 KW.

Long Span on Cheat River

West Virginia-Maryland Power Company Has Strung at Gorge a Five-Conductor Span 4,317 Ft. Long, Made with Mixed Copper and "Copper Weld" Conductors—Details of Towers and Installation

By C. F. SHEAKLEY
West Penn Power Company, Pittsburgh, Pa

THE West Virginia-Maryland Power Company, which together with the Monongahela-West Penn Public Service Company and the West Penn Power Company forms the West Penn System, erected and placed in operation in 1922 a transmission span which is unique in construction as well as being among the longest transmission spans anywhere in use. This span forms part of the 66-kv. transmission system of the West Virginia-Maryland Power Company, which ties together the systems of the Monongahela-West Penn Public Service Company and the West Penn Power Company, and which will eventually serve to transmit the energy from hydroelectric plants to be built in the Cheat River basin.

The span is at a point called Beaver Hole, where this line crosses the Cheat River. As noted from the profile (Fig. 3), the horizontal distance between dead-end supports is 4,317 ft., with a difference of elevation of 225 ft. between these two structures. The river is in the gorge 906 ft. below the lower support. The contour of the slopes is extremely rough, being covered with many large rocks.

Because of the inaccessibility of the location and the absence of roads—it being necessary to build such roads as were used—it was essential to design a structure which would be as light as possible without sacrificing strength. Since it was possible to anchor the structures securely, it was only necessary to use a simple column which would sustain the resultant strain in its own direction. Nor did the height of structure need to be great. These conditions resulted in the selection of 12-in. Bethlehem "H" sections for the supports. The two towers are slightly different in construction, and their individual peculiarities will be described separately.

The north structure consists of five columns spaced on 15-ft. centers, set on and bolted to the solid rock through concrete foundations which are in turn doweled to the solid rock. Each column of the structure is side-guyed with 1⅛-in. rods and back-guyed with 1¼-in. rods, each rod being provided with a turnbuckle for tightening. The external guys to the back and side are anchored by the use of split-rock anchors set 10 ft. in solid rock and grouted in. The internal side guys are anchored to a lug at the bottom of the adjacent column.

The south structure consists of five columns spaced on 35-ft. centers. The columns are set on and bolted to concrete foundations which are doweled to the rock below. These foundations have a larger surface in contact with the rock line than those of the north structure. The bedrock on the south structure being somewhat of the nature of boulders and very soft and uneven, it was necessary to put down a footing of concrete under each foundation column to fill up the crevices and make a firm footing for the concrete above. The upper part of the foundation was brought to a point above the ground line so that there is a difference of 2 ft. in the elevation of adjacent foundations. This gives the tops of the foundations a contour which is approximately that of the ground line. It resulted in a saving of concrete—something very desirable, since water had to be hauled for all of this concrete. Each column is bolted to foundation bolts which extend from the top of the foundation to the rock line. This rock was full of crevices and was soft, and it was therefore necessary to make an artificial anchorage for the back and side guys. The anchor consists of a "dead man," built up of angles and plates, which was set in solid concrete and doweled to the rock, the anchor rod being grouted in.

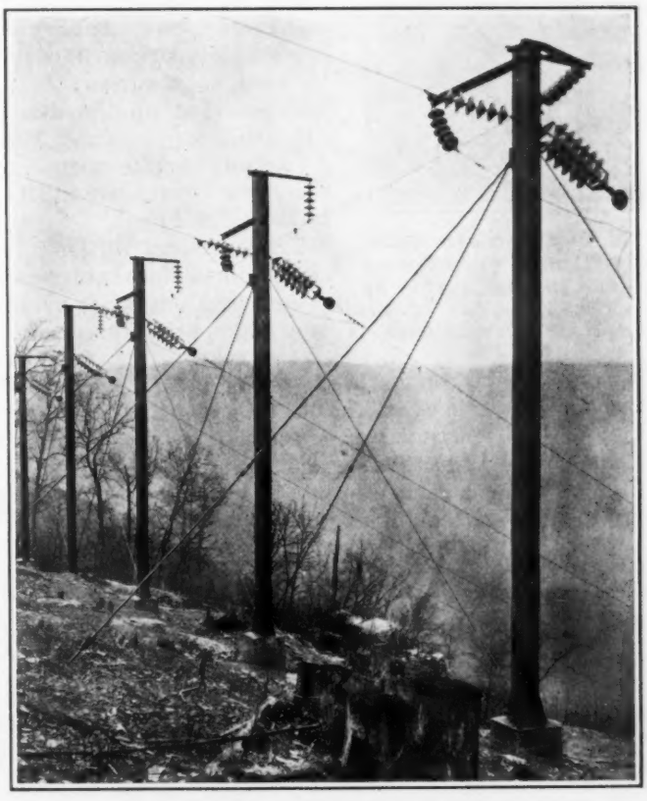


FIG. 1—A GENERAL VIEW OF THE NORTH TOWER

The crossing consists of five conductors, three for the power circuit and two for the telephone circuit. Conductors of the same size were used so as to cause synchronism of wind swing to as great an extent as possible. It was necessary only to provide adequate insulation and a means of transfer to allow any conductor to be used for the transmission of power. Therefore each structure was supplied with a transfer bus consisting of a No. 4/0 conductor suspended above the crossing dead-end insulators from brackets. This bus is provided with clips for attaching the end of the jumper between dead-end insulators, the jumper having

FIG. 2—THE CONDUCTOR IS ATTACHED TO THE YOKE ON THE DEAD END BY MEANS OF A 12-IN. SHEAVE ARRANGEMENT

a bolted splice which is readily removable, the same bolt being used to fasten this end to the transfer bus.

To facilitate the work of the men making a transfer, each column has rungs placed across the webs of the "H" section so as to form a ladder beginning at a point 8 ft. above the ground. The transfer bus was placed above the dead-end crossing insulators so that the brackets supporting it could be used as a support to a man working on the dead-end insulators or clamps. The general arrangement of the north tower structures is shown in Fig. 1.

Triple strings of Jeffery-Dewitt insulators are used for dead-ending the crossing conductors, using three-point strain yokes. The yoke is attached to the column by means of a "U" bolt bolted through the flanges of the "H" section and spanning the web. The conductor is attached to the yoke by means of a 12-in. sheave arrangement as shown in Fig. 2. The conductor is passed around the sheave and fastened to itself, using five Crosby clips. Copper liners are used between the conductor and sheave and between the Crosby clips and the conductor.

The conductors are mixed-strand copper and "copperweld" (copper-clad steel), the core consisting of seven strands of high-strength "copperweld" and the outer layer of twelve strands of copper. The conductor has a conductivity equivalent to 158,500 circ.mil., a diameter of 0.530 in., with a dead weight of 0.646 lb. per foot, the ultimate strength being 15,050 lb. The conductors were strung in so that under heavy loading conditions—i.e., ½ in. of ice, 8 lb. wind and 0 deg. F.—the tension would not exceed half the ultimate.

Under stringing conditions—i.e., 60 deg. F., no wind and no ice—the stringing tension was 2,855 lb. and the sag 538 ft. below the lower support. The conductors were sagged in by transit, the two alternate inside conductors being sagged 11 ft. more than the others. In stringing the conductors it was necessary to pad many rocks with a log padding to prevent damage to the conductors and subsequent failure.

Many difficulties were encountered in the construction. Two crews, for instance, were required to do the work, one crew working on each structure. The need for this was caused by the fact that owing to the ruggedness of the country it was impossible to travel between the structures with any ease.

The towers as built have resulted in a structure which is strong, reliable and easily maintained. The use of "H" columns instead of fabricated steel makes painting easy, with a minimum of exposed surface which cannot be reached. The anchor rods are much larger than required, so that there can be an excess in the deterioration of these rods with a good remaining factor of safety.

Calibration of Induction-Type Overload Relays

Oscillographic Study of Electrical Characteristics Shows that Iron Saturation Makes Phantom Testing Unreliable

BY R. A. ANDREWS
Sheffield Scientific School, Yale University

IT IS often found that an overload relay which functions satisfactorily while being calibrated does not give the same performance when in service. This means that the relay when in service does not operate in the same time interval it did when calibrated. This discrepancy is traceable to calibration being made by phantom loading. Figs. 1 and 2 show the difference in operation between relays on phantom load and the same relays when in service as represented by the curve "actual load."

Oscillographic study of the electrical characteristics of the relay shows that iron saturation of the small transformer in the relay makes phantom testing unreliable. The effect of iron saturation is to cause variations in the relay impedance. This variation may cause voltage distortion, current distortion or both.

The oscillogram (Fig. 5) pictures sinusoidal current in a relay under service conditions (actual load) and the distorted voltage across the terminals. This distortion increases with a current increase. Connections are as in Fig. 3.

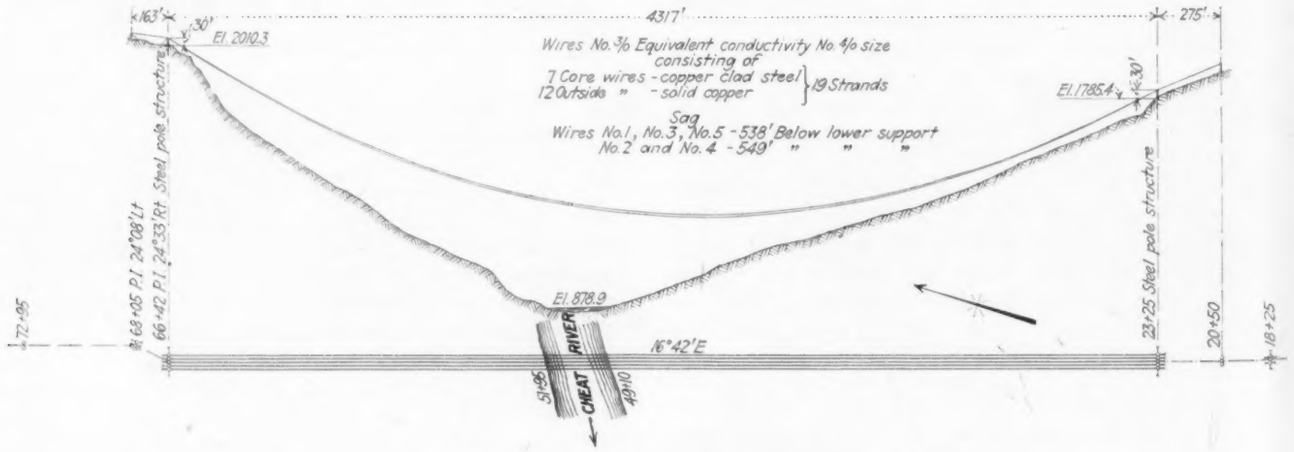
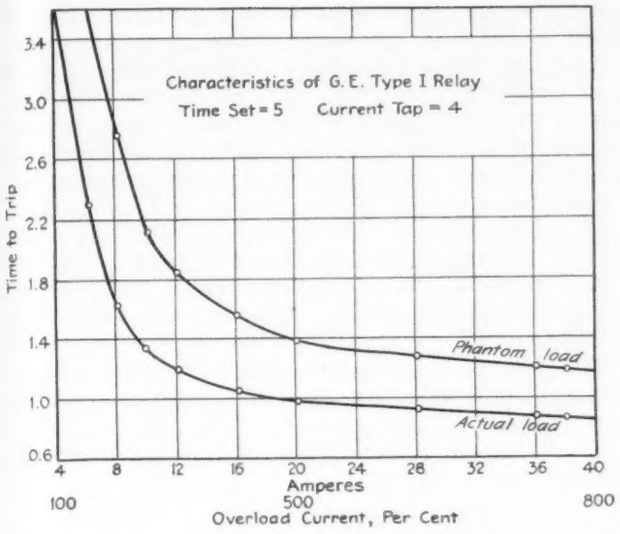
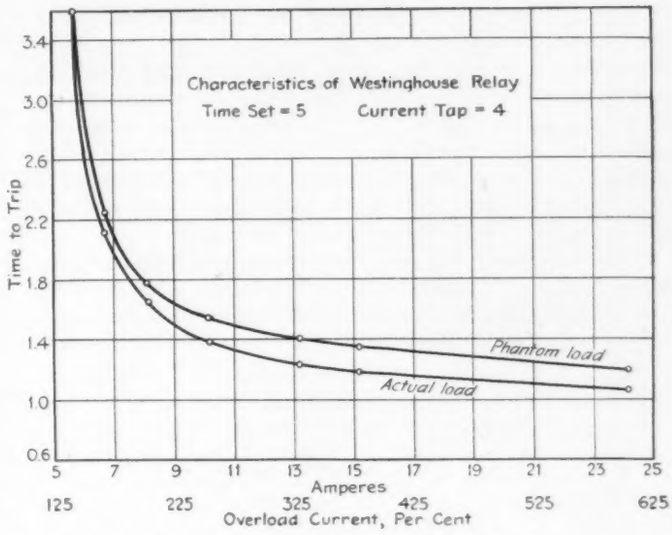


FIG. 3—PROFILE OF THE BEAVER HOLE SPAN





FIGS. 1 AND 2—RELAY CHARACTERISTICS WITH PHANTOM LOAD AND WITH RESISTANCE LOAD

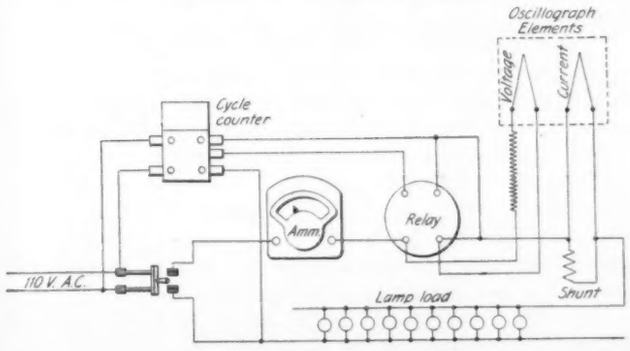


FIG. 3—CONNECTIONS FOR RESISTANCE LOAD TESTS

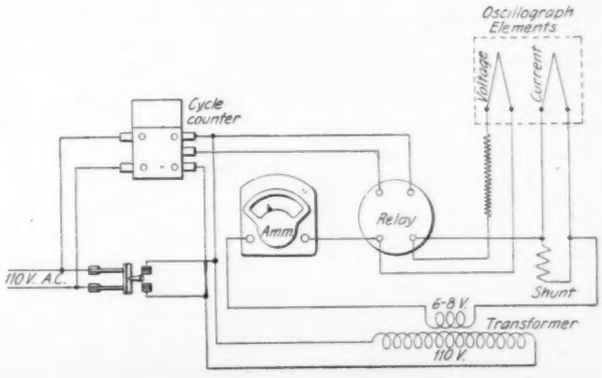
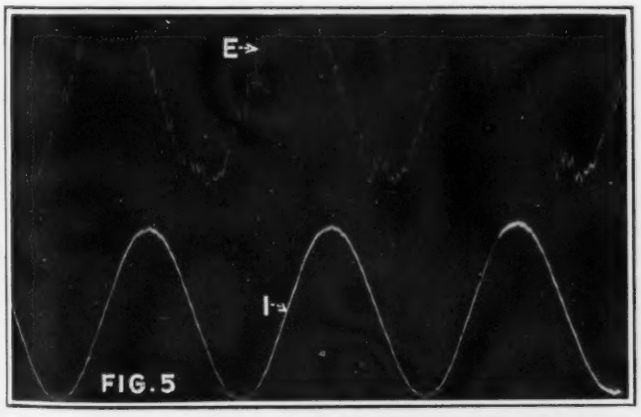
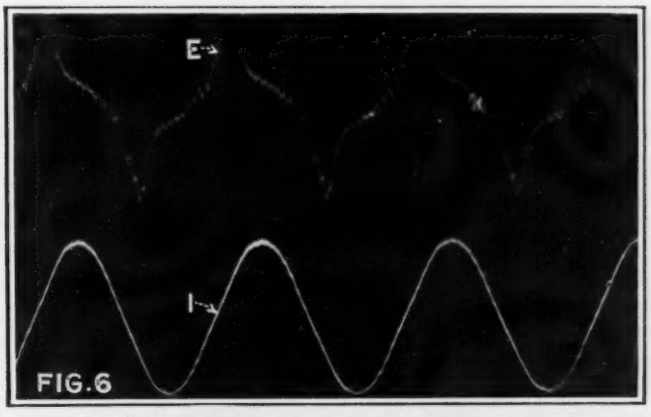
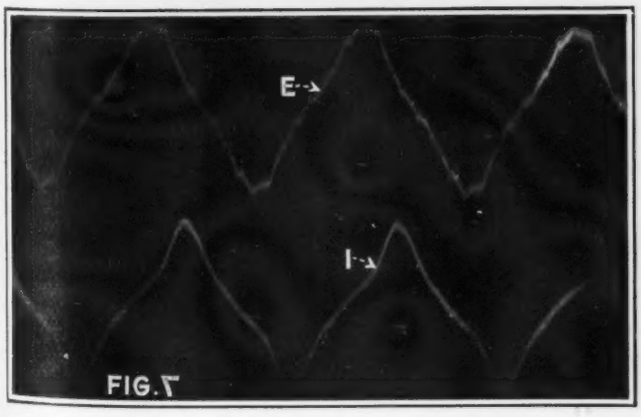
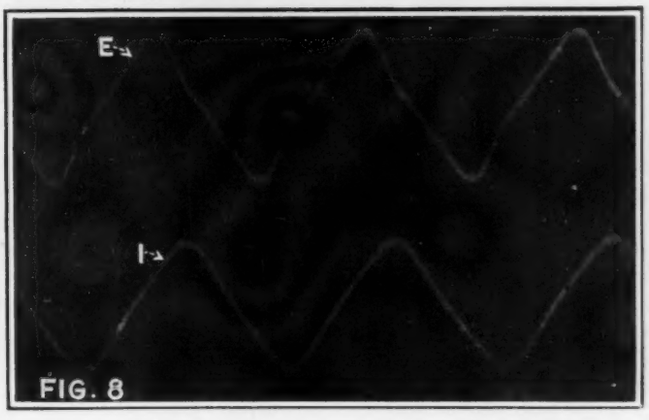


FIG. 4—CONNECTIONS FOR PHANTOM LOAD TESTS









OSCILLOGRAPHIC STUDIES SHOWING WAVE DISTORTIONS

Fig. 5—Actual load on C. O. Relay, 400% load.
Fig. 6—Actual load on I Relay, 400% load.
Fig. 7—Phantom load on C. O. Relay, 400% load.
Fig. 8—Phantom load on I Relay, 400% load.

This voltage distortion is of the general form of a combined fundamental sine wave and higher harmonics, or, in other words, the wave form obtained from an electromagnetic device working on the saturated portion of its magnetization curve. The current wave, however, is that of service conditions. If this relay is connected, as in Fig. 4, to a phantom load, current and voltage as shown in Fig. 7 result. Here both current and voltage are distorted. The current is non-sinusoidal.

The difference between these two loadings is that, while the relay currents may be the same—that is, have the same mean effective values as read on a meter—the magnetic effects produced by the two different wave

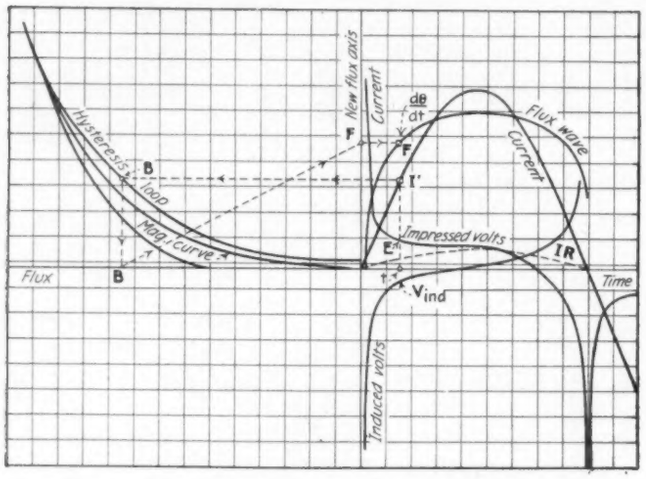


FIG. 9—ANALYSIS OF VOLTAGE AND CURRENT WAVE DISTORTION WITH PHANTOM LOADS

shapes are of different magnitudes, and since it is flux that operates the relay disk, the time to trip for the two cases will be different even though the currents are the same.

Since the relay impedance varies as noted above, it will require either a non-sinusoidal or distorted voltage to force a sine wave of current through it or a distorted current with sinusoidal voltage. With actual loading the distorted relay voltage (equaling from 6 volts to 8 volts) is such a small portion of the total voltage (110) of the whole circuit that when introduced into that total voltage it has a negligible effect, being absorbed as it were by the voltage of the lamp or resistance load. Hence the source voltage is sinusoidal and the current is sinusoidal in spite of the small distorted relay voltage. But if the relay is connected to the 6-8-volt side of the phantom load, the relay voltage, equaling the applied transformer voltage in this case, distorts it somewhat in spite of the phantom load tending to preserve a sine wave electromotive force at the 6-8 volt terminals. The result is a distorted current in the relay circuit, although there is still some distortion in the relay voltage. The phantom load is sinusoidal because it is operated unsaturated from a sine-wave source.

The voltage distortion caused by the saturation of the relay transformer is explained by Fig. 9. By combining a transformer's hysteresis loop and a current wave so that they have, for convenience, a common current axis the flux wave of the transformer may be drawn. From the rate of change of the flux wave the induced voltage is found, and this except for a small *IR* drop is equal and opposite to the impressed terminal voltage.

Thus for a current of value I at instant t a flux B is present at this same instant t. This point or value of flux B projected to a new flux axis coinciding with the current axis so that the same time axis may be used gives a point F on the flux wave produced by the current at time t. Since the flux is changing, a voltage wave is induced equal to minus the rate of change of flux ($-d\Theta/dt$). (Minus because the induced emf. opposes the change of flux.) $d\Theta/dt$ at F = induced voltage. This induced emf. balances (equal and opposite to) the impressed emf. minus *IR* drop. The *IR* drop is added to this in phase with the current to give the total impressed volts, E. The total impressed voltage waves comes out like that of the oscillograms.

This solution demonstrates that saturation causes voltage distortion, because without saturation the hysteresis loop disappears and the flux wave has the same shape as the current wave, and hence the voltage is also of the same form.

An Electromagnetic Process for Recovering Coke and Coal from Ash

A SIMPLE electromagnetic "dry separating process," which it is claimed is capable of recovering coke and unburned coal from ashes from industrial firing, at the same time avoiding losses and other disadvantages attached to previously known processes, has been introduced by the Friedrich Krupp Company at its plant at Magdeburg, according to a report forwarded to the Department of Commerce by W. T. Daugherty, assistant trade commissioner at Berlin.

The process is based on the fact that hard-coal slag responds to attraction in a highly concentrated magnetic field, while coal and coke do not. This difference of behavior in the magnetic field is explained by the fact that when the coal is burned, even if it is finely ground, the iron-containing unmagnetic materials are transformed to magnetic iron compounds which go over into the slag, making it responsive to magnetic attraction.

The quantity of unburned fuel in coal ashes varies according to the properties of the coal and the nature of the firing. Many different experiments which the Krupp concern tried with different sorts of coal have shown that a 30 per cent weight of coal ashes is recoverable as coke and coal. In many cases it was found that 50 per cent weight was fuel, and in some cases even more. The process is recommended by the Krupp concern to all consumers of coal.

As a result of more than 800 experiments with ash samples of different origin, it has been shown that the slag from all bituminous coal is of magnetic character. Separation in the magnetic field also is possible with lignite ashes.

In order to work from about a quarter of a ton to two tons of ashes an hour, a magnetic drum is necessary as well as a feeder and shaker screen. The ashes are fed to the magnetic drum from a shaker screen or sieve. The separation of the slag from coke and coal occurs on the drum in such a manner that the slag is attracted by the powerful magnetic force and held fast on the revolving drum, until it emerges from the magnetic field after a half-revolution and is thus thrown off, while coal and coke are thrown off previously. It is desirable to crush the ashes into small particles which can then be attracted within the field of two or more magnets in the drum.

Merchandising in Chattanooga

Experience with Appliance Sales—Organization of Department and Compensation of Salesmen—Typical Ways of Handling Specialty Divisions in the Field—Operating Methods and Records

By H. M. CAMP
Lighting Sales Manager
Tennessee Electric Power Company, Chattanooga, Tenn.

THE sale of appliances by central-station companies is a good business both from the standpoint of making money and of building load. Operating under its proper share of overhead expenses, the appliance department of the Tennessee Electric Power Company in the Chattanooga district made gross sales of $214,000 last year and expects to increase this to $305,000 during the present year. This business was done in a territory containing about 17,000 residential customers and represents a business of about $12.50 per customer. As evidence of the incidental effect of increased revenue it may be mentioned that the average revenue from the sale of energy to lighting customers has grown from $23 in 1917 to $28 in 1923.

This business is carried on under competitive conditions as other dealers are active in the territory, and it was felt necessary primarily to introduce and pioneer new devices for use in the homes. The fundamental policy in merchandising is to sell at list prices and to sell continuously by using a local sales staff in conjunction with an appliance store. The organization that has been developed consists of the following groups, and their scale of payment has been fixed in the light of past experiences:

1. Five salesmen in the appliance store.
2. An outside staff of twenty-five men.
3. A range demonstrator who operates inside and outside the store.

The outside sales staff is made up of specialty men who work in allotted territories for the most part and are divided as follows:

1. One man handles lamp contracts from manufacturers and merchants. He is paid a commission on a sliding-scale basis fixed by the profits available after discounts are applied and the size of the contract; for example, he is paid $8.33 for a $100 lamp contract.
2. Three vacuum-cleaner salesmen who operate under the Hoover co-operative plan and receive about $10 per sale.
3. A "Frigidaire" salesman who receives a 15 per cent commission with a minimum monthly guarantee of $150.
4. Five electric-range salesmen who receive a flat $50 per month plus a commission of 10 per cent on all range sales made in their respective territories.
5. Seven washing-machine salesmen who are paid a commission of 10 per cent on all washing-machine sales made in their respective territories.
6. Five salesmen for miscellaneous small appliances are paid on a basis of the sales price of the appliance and its value as an energy user. If the article uses 400 watts or more and sells for $25 or more, a commission of 22 per cent is paid, and this commission scales down gradually to 10 per cent for small, inexpensive appliances that use little energy.
7. A supervisor is placed in charge of the twelve salesmen listed under 5 and 6.
8. Two men work on house-wiring contracts continuously, and there remain in the territory fewer than two thousand unwired homes.

How the Demonstrator Works

A woman is used continuously as a demonstrator for electric ranges and spends about one-third of her time in the store and two-thirds of her time outside in customers' homes. Every Thursday afternoon a range demonstration is held in the store, and a very good attendance has been maintained consistently. On the outside work the demonstrator calls at least once on a new customer and gives instructions on the operation of the range. In addition the demonstrator handles complaints from customers which are based on range performance and gives instruction to the complaining customer until all trouble has been removed.

RETURN-COUPON ADVERTISEMENT HUNG ON DOORKNOBS BY METER READERS

How the Business is Divided

On the basis of 1923 gross sales the following tabulation gives an indication of the division of sales:

"Frigidaire"	$23,000
Electric ranges	90,000
Lamps	42,000
Vacuum cleaners	39,000
Small devices	20,000
Total	$214,000

For 1924 the following quotas have been set:

"Frigidaire"	$50,000
Electric ranges	120,000
Lamps	45,000
Vacuum cleaners	50,000
Small devices	40,000
Total	$305,000

To check operations charts are prepared showing the

number of sales expected in each division for each month of the year and the actual number of sales made. This gives an easy graphical check on all sales. The total quotas for the year are divided into monthly sums which differ in magnitude and which carry correspondingly different advertising appropriations. One reason for this is the effect of the different seasons of the year and another object pursued is to introduce certain appliances when, owing to the season, there is a tendency for energy consumption to decrease. Experience has indicated that the consumer places the blame for the increased bills naturally resulting from shorter days on new appliances, and good psychology dictates the use of April, May and June as the best months to sell certain devices and October, November and December as favorable months for other appliances.

How Sales Are Made

Sales are made by working continuously throughout the year and intensifying the effort in the spring. Special sales are made at intervals on certain appliances such as floor and table lamps. Prospective customers are reached by three general methods:

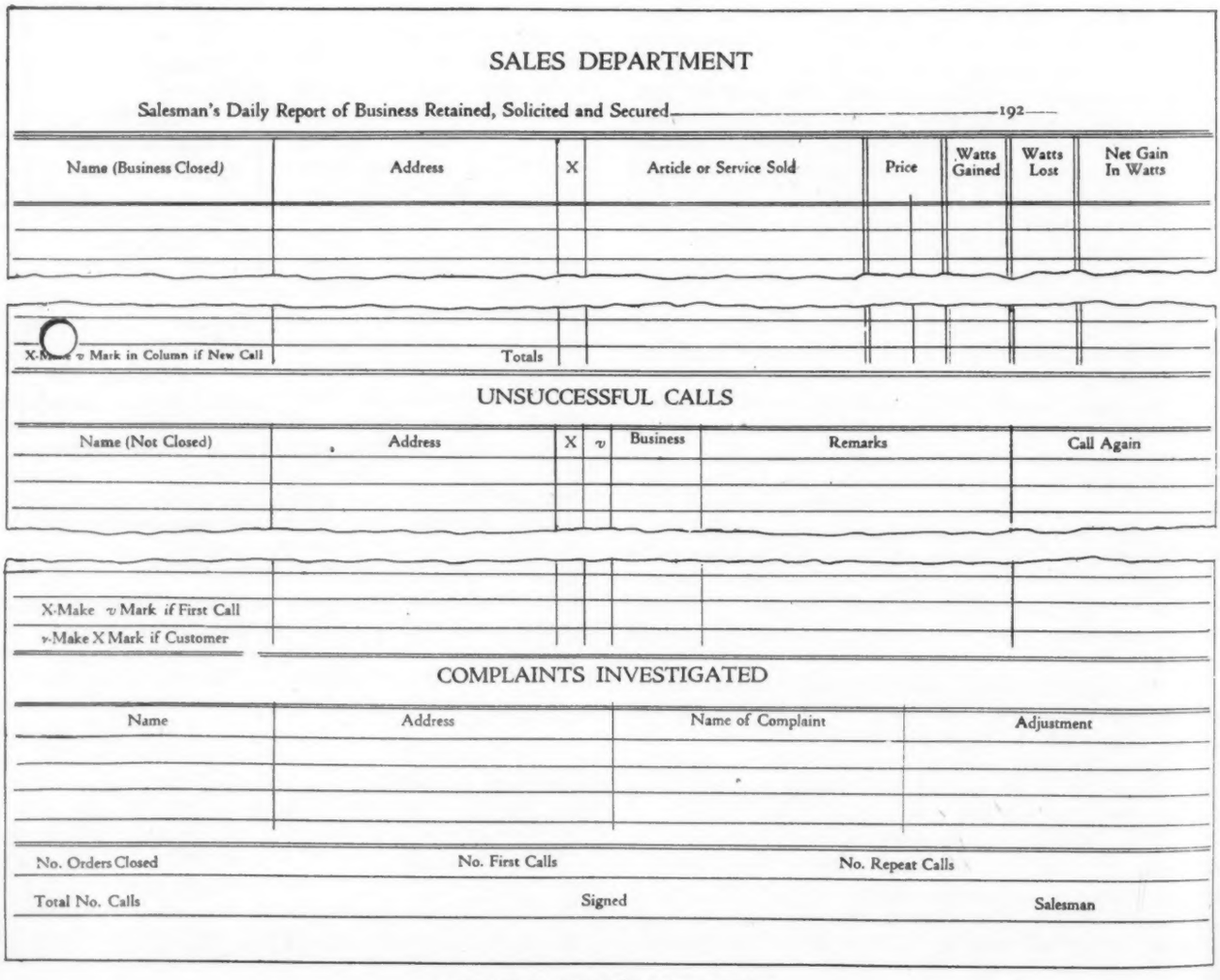
1. Newspaper advertising.
2. Direct mail advertising, using small cards in monthly bills of the type illustrated and using circular letters and folders.
3. Door hangers have been devised of the type illustrated. These are hung on doorknobs by meter readers during their monthly visitations.

All these methods have proved effective; for example, the folder shown in this article for inserting in the bills sold 100 irons in fifteen days, the period for which records were available when this article was written.

Last year fifty-two "Frigidaire" units were sold and thirty-eight additional units were sold up to April 15 of this year. Another interesting experience has recently occurred with washing machines. Because of negro servants, comparatively cheap wages and the social customs of the South many Southern utilities have made no attempt to sell washing machines. As an experiment a washing-machine sales staff was started to work on March 24 of this year in the Chattanooga district. It sold thirty-eight machines in the first week, and this sale had increased to eighty-seven on April 15. The washers were sold at a price of about $145 on a time-payment basis. The purchaser could pay $1 down and $10 per month or $2.50 per week as desired, and the slogan, "Two-fifty per week is just the price of the usual washing," was a very successful sales agent.

Another interesting experiment was a special sale of floor and table lamps, covering a period of a week and allowing an increased discount as time elapsed, as follows:

Day	Discount, per Cent	Number of Units Sold
Wednesday	10	0
Thursday	15	4
Friday	20	14
Saturday	25	23
Monday	30	12
Tuesday	35	27
Wednesday	40	41



SALES DEPARTMENT

Salesman's Daily Report of Business Retained, Solicited and Secured——————192——

Name (Business Closed)	Address	X	Article or Service Sold	Price	Watts Gained	Watts Lost	Net Gain In Watts
X-Make ✓ Mark in Column if New Call	Totals						

UNSUCCESSFUL CALLS

Name (Not Closed)	Address	X	✓	Business	Remarks	Call Again
X-Make ✓ Mark if First Call						
✓-Make X Mark if Customer						

COMPLAINTS INVESTIGATED

Name	Address	Name of Complaint	Adjustment

No. Orders Closed — No. First Calls — No. Repeat Calls

Total No. Calls — Signed — Salesman

OUTSIDE SALESMEN'S DAILY REPORT

THE TENNESSEE ELECTRIC POWER COMPANY

SALES DEPARTMENT

REPORT OF Robert Wallen DATE April 8 19 24

	ARTICLE SOLD	AMOUNT	CASH	CHG
1	1 Universal Washer	145.00	1.00	—
2				
3				
4				
5				
6				
7				
22				
23				
24				
25				
	TOTAL NUMBER SALES			
	TOTAL AMOUNT			
	TOTAL CASH			
	TOTAL CHARGE			

[OVER]

DATE _____ 192__

WE CALLED TODAY TO REPAIR YOUR _____

BUT FOUND NO ONE AT HOME. UNLESS YOU NOTIFY US WE WILL CALL AGAIN

DATE _____ ABOUT ____ A.M. ____ P.M.

FLOOR SALESMEN'S DAILY REPORT. INSET, CARD LEFT BY SERVICE MAN WHEN CUSTOMER IS NOT AT HOME

The "HOW"

This SPECIAL OFFER

ALL THRU APRIL

Ironings are Done Quicker, Better and Easier with a Westinghouse Iron.

It heats uniformly, has a beveled edge and tapered point.

Westinghouse Electric Iron

—AND—

$1.50 "LACE-ON" PAD

FOR THE PRICE OF THE IRON

$6.75 Special

75 Cents Cash

BALANCE IN SIX MONTHS

The Tennessee Electric Power Co.

"At Your Service"

Market St. at Sixth Phone Main 5900

ADVERTISING MATTER INCLOSED WITH MONTHLY BILLS

The reverse side of the illustration on the left is used for memoranda of complaints and new merchandise needed for stock.

As a final effort all lamps left at the end of the sale were advertised for Thursday at a 40 per cent discount with a dollar down and deferred payments. This, however, proved to be a disappointment, as it rained hard all day and only five lamps were sold.

It is interesting to note that past experiences indicated that people were willing to pay about $30 for a floor lamp, and most of the sales on Wednesday were at this net figure. Tags were used on all lamps which carried the normal list price and customers were asked to compute their discount.

And Then Came Ranges

There are about one thousand electric ranges in the district, which help to bring a return, on an average, of $7 per month per customer for lighting and cooking where these installations have been made. A combination cooking and lighting rate of 9 cents per kilowatt-hour for the first 40 kw.-hr. and a $3 monthly minimum charge has been used, and it is interesting to note that a survey of customers showed an average consumption without ranges in use of 37 kw.-hr. per month per customer. This rate has worked out very successfully, and ranges have sold quite readily on a plan of $10 down and payments deferred up to fifteen months. The usual payment, however, is $10 per month.

No trial sales are made, and all contracts are closed before the ranges are delivered to the consumer. The contract price covers installation complete, and after some study the operating department has agreed to absorb a maximum charge of $108 per range for installation costs or a charge based on three years' operation at the minimum rate of return. In some cases installation costs are greater than this figure, but on an average basis it has worked out very satisfactorily. Several standard types of ranges are sold, and it is to be noted in connection with range sales that artificial gas is priced at $1.65 in the same district.

General Operations

The department functions with a minimum of red tape, and each salesman has a free hand in his own territory and the advantage of the combined experiences of all the staff. A copy of a daily sales report card for employees in the store is shown. This provides space on the back for notations about complaints, merchandise asked for but not carried in stock and other information obtained in daily work which can help the customers or the company. Another useful practice is to supply personal cards to service men with notation on the back as indicated in one of the illustrations. A form of daily report for outside salesmen is also shown. A repair department is maintained in the basement of the store, and all appliances are guaranteed for a year, after which charges are made.

The department carries its proper proportion of overhead executive costs of the company and pays rental for its store space. It has made some money during the past, although recently it has moved into new and decidedly more expensive quarters, so that time alone will determine the state of the balance sheet. But, aside from direct profits or losses, the merchandising department is an essential element in introducing energy-consuming devices and new appliances which are very effective in an indirect way in adding to the revenues of the company.

Letters from Our Readers

A Place Set Apart for Suggestions, Comments and Criticisms, to Which All Men of the Electrical Industry Are Cordially Invited to Contribute

The Standardization of Frequency

To the Editors of the ELECTRICAL WORLD:

The description in a recent number of the ELECTRICAL WORLD of the dilemma due to having frequencies of both 50 cycle and 60 cycles in Japan* gives much information which should be valuable in several parts of America where more than one frequency is in use. The difficulties incident to such a state of affairs and the restrictions put upon interconnection of lines and interchange of energy bring home the lesson that where two frequencies are in use a choice between them should be made without delay and a policy adopted regarding all future extensions.

Comparisons between two frequencies can be grouped into three main classes according to the answers to the following questions: First, in what features is one frequency preferable to the other when used in an isolated system? Second, which frequency is the more strongly established at present and how difficult will it be to make changes? Third, which frequency is used to the greater extent in neighboring systems and how desirable is it to use the same frequency as they do? It is noteworthy that the third class of comparisons is becoming more and more important owing to the rapid growth in recent years of the power loads of all systems and of the distances to which power is transmitted.

Suppose that there is a district supplied by a power system at a non-standard frequency the center of load of which is 200 miles or more from the nearest large standard-frequency (60-cycle) generating plant. Such a district would probably call its power system isolated and self-contained. It could no longer be called isolated, however, after its growing load compelled it to look beyond the local generating system for an additional power supply. If the block of power required is large, say of the order of 200,000 kw., then the distance to which it is now considered feasible to transmit the power is very great, being as much as 300 miles or 400 miles.

The power available in neighboring districts would almost certainly be 60 cycles for the United States or Canada, and the district using a different frequency would find that there were very serious difficulties in the way of increasing its power supply. It is not economical or satisfactory to supply a large block of power permanently through frequency-changer sets, and it would be necessary to change part or all of the district to use 60 cycles. With a steadily growing load, the demand is doubled every few years, and if the additional power supply is 60 cycles, new installations and large extensions will tend to be made at 60 cycles. The question of how well established the non-standard frequency may be, or whether that frequency may be more or less desirable than 60 cycles in some particulars, becomes of minor importance, and the question of how to obtain sufficient power from the neighboring 60-cycle districts to satisfy the growing demand becomes of paramount importance.

It is evident that where the frequency of 60 cycles is as well established as it is throughout the United States and Canada a system with a steadily growing load using any other frequency will ultimately be forced to adopt 60 cycles in whole or in part, the completeness of the change depending on the rate of growth of the load. If this change must come ultimately, the sooner it is planned for and begun the better. To adopt a rule at an early date that new generators and new power-consuming installations in certain parts of the system are to be 60 cycles may introduce some expense in duplicating the distribution lines and in providing reserve power, but it may save large expenditures later when the use of 60 cycles is being taken up more seriously.

A load which increases 10 per cent each year doubles itself in about seven years. Seven years after deciding to change to 60 cycles approximately one-half of the system would be 60-cycle, taking into account the facts that not all new extensions can be made 60-cycle and that some of the old non-standard motors will become worn-out, out-of-date or not suited to the changing requirements of the owners.

While it may be stated on the one side that the frequency of 60 cycles involves cheaper apparatus and provides a larger variety of motor speeds than any other commercial frequency, which are, moreover, speeds for which mechanical appliances are almost universally designed in America, and while it may be stated on the other hand that a certain frequency other than 60 cycles is very firmly intrenched in a certain district, none of these items is so important to a steadily growing system as the fact that the up-to-date way of obtaining additional power is by transmission from neighboring districts and that the available power will almost certainly be found to be 60 cycles in this country. The change-over from one frequency to another may conveniently be made by the aid of a comparatively small proportion of reversible frequency-changer sets, which will also function to a large extent as synchronous condensers. A power system in this country which does not use 60 cycles should therefore seriously consider, at the earliest possible date, ways and means for a gradual change to that frequency.

Canadian Westinghouse Company, Ltd.,
Hamilton, Ontario. H. B. DWIGHT.

*"The Japanese Frequency Dilemma," by Minoru Fukuda, chief engineer Toho Electric Power Company, Ltd., Tokyo, Japan; ELECTRICAL WORLD, Feb. 23, 1924, page 381.

Mr. Behrend Never a Business Associate of the Late C. E. L. Brown

To the Editors of the ELECTRICAL WORLD:

Will you have the kindness to correct as promptly and conspicuously as possible part of your comment on my obituary notice of C. E. L. Brown? Your statement closes with the words ". . . and who for many years was associated with him in electrical machinery design."

I have never been associated in any business way whatever with Mr. Brown; in fact, he headed the Brown-Boveri company while I was with the Oerlikon company in the early days of electrical competition. Reference to this is also made in the first article of my tribute to him published twenty-three years ago in your paper.

B. A. BEHREND,
Consulting Engineer.
Boston, Mass.

Central Station and Industrial Practice

Installation, Operation, Maintenance, Test and Repair of Generation and Distribution Equipment, and Methods of Economically Utilizing Electric Service in Large Industrial Plants

Salt-Velocity Stream-Flow Measurements

By George M. Will
General Superintendent Southern Sierras Power Company, Riverside, Cal.

In HYDRAULIC work it frequently happens that no adequate means for measuring water flow has been provided, or where a weir or meter has been installed the question of accuracy often arises. The salt-velocity method of measuring the flow of water in pipe lines, flumes or open canals of constant cross-section, as first suggested by Prof. C. M. Allen of the Worcester (Mass.) Polytechnic Institute, has proved to be inexpensive and very accurate. (See article entitled "Water Measured by Salt-Velocity Method," Electrical World, January 19, 1924, page 142).

This method of testing was used recently by the Southern Sierras Power Company for measuring the water velocity in the flow line at one of its hydro-electric plants at Bishop, Cal. The purpose of the test was to check the accuracy of a Venturi meter which has been installed. The flow line in question was a 60-in. wooden-stave pipe. Two sets of electrodes were placed in the line through stuffing boxes a distance of 2,000 ft. apart. These were connected in parallel to a 110-volt circuit, and a graphic wattmeter was placed in the circuit to record the energy flowing between each pair of electrodes. A small amount of a concentrated solution of salt water (four or five gallons) was introduced into the pipe line a short distance above the upper pair of electrodes. As the salt water passed each pair of electrodes the energy flow was increased, which was shown on the wattmeter record. By checking the interval of time between these two points on the record of the meter the rate of flow of the water was calculated.

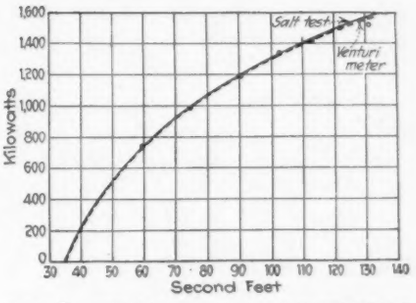


FIG. 2—COMPARISON OF SALT-VELOCITY TEST WITH VENTURI METER RECORD

The graphic wattmeter used had its clock speeded up for a paper speed of about 10 in. per minute. In order to get a more accurate measurement of the time interval than the travel of the paper would afford, a stop watch was used in checking the time between the points *A* and *A'* on the chart, shown in Fig. 1. From this it was possible to calculate the time between the points *B* and *B'* on the chart, which represents the instant when the salt solution exerted its maximum influence on the electrodes. This time element between the points *B* and *B'* was used in calculating the flow of water in the pipe.

A comparison of this record with that of the Venturi meter gave a check on the accuracy of the meter. In Fig. 2 is shown the plotted record of the Venturi meter and the salt-velocity record for several loads on the power plant.

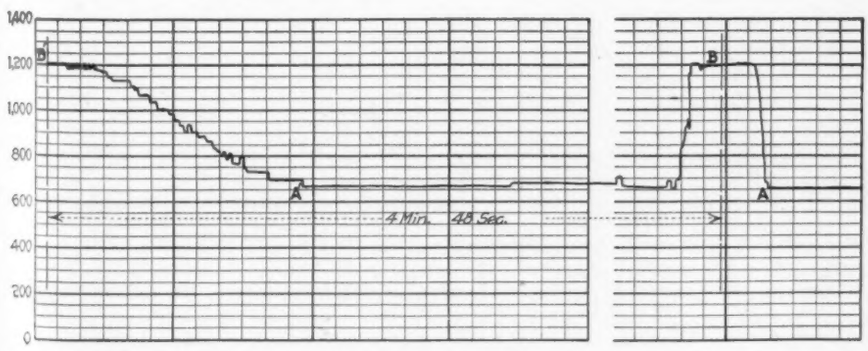
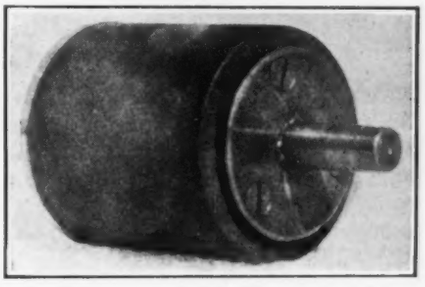


FIG. 1—SALT-VELOCITY WATER-FLOW TEST

A Neat and Compact Ammeter Multiplier

By G. H. McKelway
Westfield, N. J.

In ATTEMPTING to get curves of the loads on certain railway feeders by using a curve-drawing ammeter, it was found that the meter owned by the railroad company, when used in connection with the shunts of the switchboard ammeters, did not read high enough to record the maximum of many swings, although the normal load was well within the range of the chart. To record these swings it was necessary to add an external resistance, which was done by adding twice the resistance then in the meter and leads, thus multiplying its effective range by three. The resistance coil was wound on a core and slipped inside of the hole of a small cylindrical wooden block, bored out so as to make a close fit. The ends of the resistance wire were soldered to two brass ends screwed into the wood. From one of these ends there projected a brass plug machined to fit into the sockets in the meter, while the other was drilled out so as to provide a socket into which the plug on the end of the lead could be inserted. The completed resistance was approximately 2 in. high and 2 in. in diameter.



BY ADDING RESISTANCE RANGE OF METER IS INCREASED THREE TIMES

Adding this resistance in this

manner made a very neat and more satisfactory job than if one of the meter leads had been cut and an additional resistance inserted into the circuit.

Locating High-Resistance Faults in Cables

BY C. G. WATSON
Engineering Department Duquesne Light Company, Pittsburgh, Pa.

IT HAS been observed that a cable will sometimes become faulty, but as soon as the voltage is removed the fault seems to clear itself. This has been noted more often when testing a cable or line before it has been placed in service. Usually this fault occurs in a joint where the filling compound is in a semi-liquid state. On overhead lines intermittent faults occur at broken insulators.

Such faults are often extremely difficult to locate as the apparatus available is not sufficiently powerful to supply the current needed to carbonize the insulation so that a location test can be made by one of the usual methods, and naturally it is very unsatisfactory practice to put a cable or line of this type back into service. The following method has been developed to deal with the class of faults mentioned above:

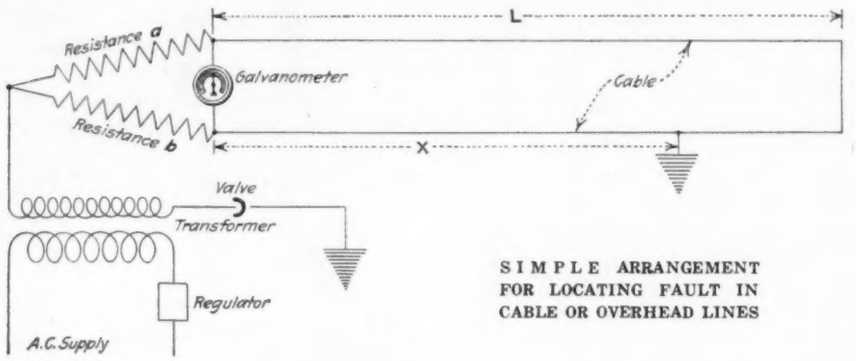
The faulty conductor is connected to a sound conductor, in order to form a loop. Across this loop an adjustable resistor with a galvanometer across the junctions is connected, as shown in the accompanying illustration. A high-tension direct current from a transformer and kenotron tube is then supplied between a movable contact on the resistance and ground. From the illustration it will be seen that the connections form a bridge, high-tension direct current being used in this arrangement instead of the usual low-voltage battery.

Making a test with the connections shown and obtaining a balance, the distance of the fault from the testing end can be calculated from the equation:

$$x = \frac{2bL}{(a + b)}$$

where x = distance of fault from testing end,
L = route length of cable,
a = resistance of arm connected to the sound conductor,
b = resistance of arm connected to the faulty conductor.

A simple way in which to put the method into practice is to connect together firmly two conductors, only one of which is faulty, at one end of a cable, and at the other end to connect a convenient length of, say, No. 20 tinned copper wire and to slide the lead from the transformer along this wire until the galvanometer shows that a balance has been reached. Then measure the lengths of wire between the point of contact of the slide and the cable terminals and, calling the lengths a and b, use the equation above to determine the position of the fault. This arrangement may be somewhat crude, but any desired degree of accuracy can be obtained by using a long enough piece of wire, and generally 10 ft. of wire is enough.



SIMPLE ARRANGEMENT FOR LOCATING FAULT IN CABLE OR OVERHEAD LINES

Washing Insulators in Chile

CHILE has a climatic condition which introduces many problems for transmission-line engineers. On the 87-mile, 110,000 volt-line of the Chili Exploration Company insulator problems of an interesting character are encountered. Near the coast the Pacific swell causes salt mist to be carried inland by the prevailing winds for 8 miles. The salt spray dries on the insulators during the day and gradually forms a salt incrustation that causes the insulators to flash over when moist. To obviate the trouble the insulators are washed every two weeks. Growing tired of this, the company attempted to operate without washing, but was forced to renew the practice because of flashovers.

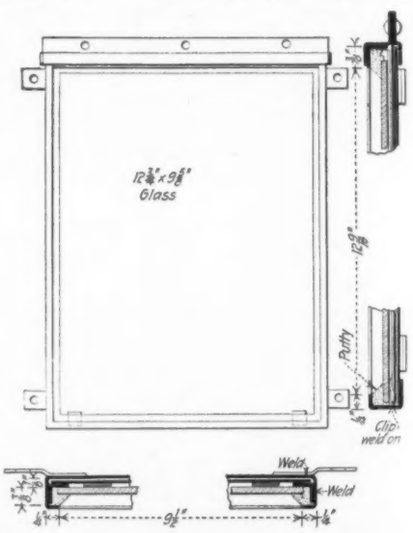
Another interesting situation is that the dry climate permits the use of insulators on the inland pampas that fail when brought to the shore. Buzz-stick tests when made on the inland insulators show them to be good, but the same insulators tested near the moist seashore are faulty. The practice is to test all insulators at the shore, but this does not insure exemption from service deterioration of those already installed, so that a shower may cause a line failure.

In spite of these conditions the line has been in continuous service since 1915 with only momentary interruption and delivers 40,000 kw. successfully over the No. 3/0 conductors, which were designed to carry only 27,000 kva. A saving feature of the climate is that lightning, snow and severe storms are unknown.

A Compact Weatherproof Bulletin Board

BY THOMAS B. NASH
Superintendent Overhead Construction Kansas City (Mo.) Power & Light Company

STANDARDIZED bulletin boards which are indicative of the attention given to detail by the Kansas City Power & Light Company are being mounted on all that company's trucks and outdoor operating equipment. On a large system like that of the Kansas City company standardization of even a small item like bulletin boards is important. Realizing this, the company drew up



BULLETIN BOARD USED ON ALL TRUCKS AND OUTDOOR EQUIPMENT BY THE KANSAS COMPANY

a plan for the board shown in the accompanying illustration. The main frame is constructed of No. 18 gage galvanized iron with welded corners and joints, thus being absolutely weatherproof. A 12¾-in. x 9⅝-in. glass is puttied into the frame, and posters are easily inserted by merely lifting off the top. To this top another strip of No. 18 galvanized iron is welded which serves two purposes —first, that of a background for the wooden supports on which the bulletins are placed, and second, that of a guide runner when resetting the board. The inside and outside of the board are painted with one coat of galvanizing primer and two coats of carbonizing coating.

Vertical Phase Isolation for Brooklyn Station

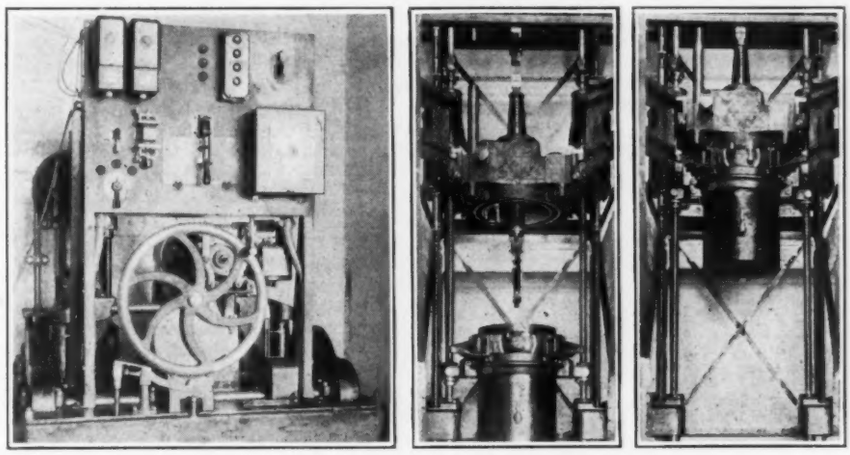
BY R. C. HARDY
Central-Station Engineering Department, General Electric Company, Schenectady

THE 28,000-volt oil circuit-breaker switching equipment of the new Hudson Avenue station of the Brooklyn Edison Company is of the vertical isolated-phase type, having mounted on each floor one pole of the breaker and on the fifth floor the operating mechanism for operating all three poles. This switch has been designed so that all operations for inspection, disconnecting or removing and changing the tanks are done electrically. All auxiliary equipment, disconnecting switches, current transformers, etc., are contained in the switch itself, thereby eliminating compartment construction.

The floor area occupied by this oil switch and its appurtenances has been reduced to a minimum of 5 ft. square. To compromise for the small horizontal dimensions, however, the switch is four stories in height, as mentioned above, amounting to slightly less than 60 ft.

The switch house is unique in that it is entirely separate from, although next to, the turbine house. Within the switch house are auto-transformers, the various auxiliary motor-generator sets, reactors and breakers. The larger breakers have an interrupting capacity of 1,500,000 kva. and a current-carrying capacity of 3,000 amp. These oil switches are for use in the generator, synchronizing bus and feeder circuit.

Each unit is mounted in a cradle which is geared to two vertical jack screws on opposite sides of the switch tank. The jack screws on each floor are connected through universal joints and are driven by a 2.5-hp. motor at the mechanism above. This allows the lowering and raising simultaneously of all three breakers. Normal operation calls for breakers in a raised position. Electrical connection is now made to the units through the closed self-aligning contact. By use of these contacts the equivalent of the disconnecting switch is incorporated in the same mounting with the breaker. Turning of the jack screws will lower the breakers and at the same time open these contacts—in effect, isolating the breakers from the high-voltage circuit. When lowered 15 in. the breaker units are in the disconnect position. Still further lowering of the breaker cradle allows the switch tank to part from the breaker proper. This is termed the "inspection position" because the breaker contacts are fully exposed.



OIL CIRCUIT-BREAKER OPERATING MECHANISM AND SWITCH IN OPEN AND CLOSED POSITIONS

The breakers are operated in unison by a rod which ties them together and which terminates at the solenoid on the top mechanism floor. The breaker contacts can be opened and closed with the unit in both the operative and disconnecting position. This facilitates examination of the contacts in closing.

In the mechanism there is a breaker control panel containing necessary relays, indicating lamps and control buttons for raising and lowering the breaker and tank. Normally control of the breaker itself is at the main station. The breakers, operating equipment, clamping handle and control panel are shown herewith.

As was mentioned above, the tank may be lowered away from the breaker. Here again the desire to obtain a simple working scheme is carried out. To remove the tank from the switch structure a truck is run in under the tank. The tank is lowered onto this truck and the cradle-holding tank is unfastened. If necessary, a spare tank can be substituted immediately.

Safety considerations have been carried out to the fullest detail. For example, the breaker cannot be closed unless it is securely clamped in either the operative or disconnecting position; neither can the breaker be lowered or raised with its main contacts closed. The breaker may be operated by a hand lever if necessary.

Each breaker unit with its cradle and jack screws is mounted in a fabricated steel frame. This steel frame is fastened directly to the steel of the building and also to the adjacent switch frame. Thus the need for concrete cells or walls is absolutely eliminated.

Some of the features and advantages worthy of mention in connection with this breaker are: Phase isolation is easily obtained, a matter of paramount importance in generating stations handling large concentrated blocks of power. Compactness is secured and a minimum of floor area required per switch. The use of the breaker unit itself as a part of the disconnecting switch is a large factor in cutting down space and material requirements. Accessibility of the breaker without the sacrifice of simplicity or ruggedness has been obtained. Merely pressing one contact button lowers the unit to a "disconnect" position. Pressing another button lowers to inspection position. The ease of removing the tank has also been mentioned. Another point of advantage, especially in the construction for such

large stations, comes in installation. Breaker units are completely assembled in their frames at the factory. The customer needs only to join the breaker frame to the building steel and make the jack-screw and operating-rod connections between phases.

Overhead Distribution Construction

Standardized Practice as Developed and Used by the
WEST PENN POWER COMPANY, PITTSBURGH

Joint Pole Construction

These specifications shall apply to all joint construction with telephone companies on wooden poles for secondary circuits of 115 volts, 230 volts or 460 volts, for primary circuits of 2,300 volts and 4,000 volts and for series, constant-current street-lighting circuits not exceeding 7.5-amp. line current. Joint construction shall not be used for circuits in excess of 5,000 volts or for series circuits in excess of 7.5-amp. line current.

Where joint construction is desirable on sound existing poles, special clearances and construction may be used during the life of such poles as agreed upon by the companies interested in individual cases. All new work and replacements shall be in accordance with these specifications.

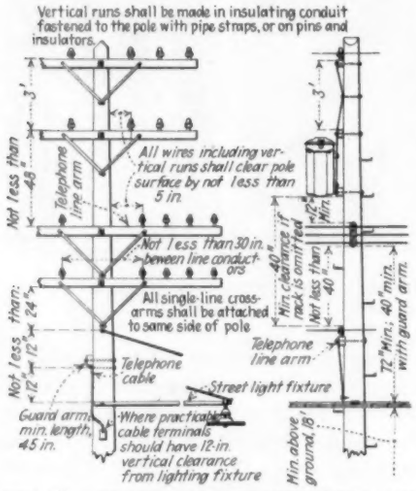

Vertical runs shall be made in insulating conduit fastened to the pole with pipe straps, or on pins and insulators.
3'
Not less than 48"
Telephone line arm
All wires including vertical runs shall clear pole surface by not less than 5 in.
Not less than 30 in. between line conductors
All single-line crossarms shall be attached to same side of pole
Not less than 24"
12"
12"
Telephone line arm
Telephone cable
Street light fixture
Guard arm, min. length, 45 in.
Where practicable, cable terminals should have 12-in. vertical clearance from lighting fixture
Min. clearance if rack is omitted
Not less than 40"
Min. above ground, 18'
12" Min.
40" min.
with guard arm.

FIG. 64—POSITION OF ATTACHMENTS AND VERTICAL CLEARANCES FOR JOINT CONSTRUCTION

In general, construction used on joint poles shall be in accordance with the specifications given in previous articles of this series, except where provision for special construction or clearance is made.

All power and lighting conductors and attachments shall be above telephone conductors and attachments and shall have the vertical clearances shown in Fig. 64, except as otherwise provided.

A clear climbing space of at least 30 in. between attachments shall be maintained up the pole, but need only be on one side or corner of pole. Where buck-arm work is employed the attachments shall be so located and maintained as to provide and keep open on one side of the pole, and next to the pole, as a vertical climbing space, a square of not less than 30 in. on a side. The pole itself and crossarm back braces may be included within the climbing space so measured.

Line wires shall be carried upon standard insulators on crossarms, except that secondaries of 460 volts or less shall be carried upon vertical racks on standard rack insulators. All single-line crossarms on any pole shall be upon the same side of such pole. If necessary, one line wire may be carried on a ridge pin above the top of the pole. All line wires carried on crossarms shall clear the surface of the pole by not less than 5 in.

All wires running laterally across a joint pole shall be held taut on bolt pins on the face of the crossarm.

Wires or cables run vertically upon a pole except above a point not less than 40 in. vertically above the highest telephone attachment shall, as far as practicable, be placed on the street side of the pole as telephone vertical wires and cables are on the field side of pole.

All vertical wires and cables shall be arranged so as not to interfere with the use of pole steps. Vertical conductors, except ground wires, shall be rubber-insulated, with standard weatherproof braided or woven covering.

In general, vertical conductors shall be carried down the pole taut upon standard top-groove insulators, supported on standard screw pins. All conductors shall be firmly held at a distance of approximately 5 in. from the surface of the pole.

Cleaning Enameled-Steel Reflectors

BY L. D. MOORE
Electrical Engineer Missouri Pacific Railroad Company, St. Louis

IN MANY locations, such as foundries, blacksmith shops, railroad engine houses and similar places, enameled steel reflectors become badly coated with a film of dirt which adheres closely to the surface of the enamel and cannot be removed by ordinary means. Abrasives damage the surface of the enamel and ordinary washing has little or no effect. Where it is possible to take the reflectors down, as is increasingly the case, the following method has proved very successful in removing the coating of grime and renewing their original reflecting power:

The reflectors are placed in a suitable receptacle, such as an iron drum or vat, containing water and carbonate of soda (also known as "sal soda" and "soda ash"), in the approximate proportions of 1 gal. of soda to 20 gal. of water. This solution, with the reflectors in it, is then boiled, either by placing a fire under the receptacle or by means of steam, for about fifteen minutes. The reflectors are then removed, rinsed thoroughly in clear water and dried. They will be found to have been restored to their original whiteness, without damage to the surface of the enamel.

Old reflectors which have been removed for some reason may be similarly treated, immersing reflector, socket and all in the solution.

The Durability of Reset Distribution Poles

BY GEORGE M. HUNT
In Charge Section of Wood Preservation, United States Forest Products Laboratory, Madison, Wis.

IF AN untreated pole rots off at the ground line but the upper part remains in good condition, how much additional life can be obtained by cutting off the rotted end and resetting the shortened pole? Presumably the wood above the ground line has been untouched by decay and is still as strong and durable as ever, but is this actually the case? Although this is a practical question which has been put to the Forest Products Laboratory a number of times, no service records or experimental data were available upon which to base an answer. The practice of resetting poles is not uncommon, however, where grade of the line, appearance and other factors permit, and the experience of the companies which have followed it should prove very useful in arriving at an answer to the question.

Accordingly, in order to strike a cross-section of the average experience, letters were recently sent by the Forest Products Laboratory to a considerable number of important pole-using companies in various parts of the country asking for the results of their observations. Altogether, replies have been received from about sixteen companies, including several engaged in national or interstate business.

As might be expected, opinions varied considerably. Most of the engineers concerned were familiar with only one species of wood and a limited region, so that their estimates were governed mainly by local conditions. Some also had the advantage of larger experience or better records than others. On one

point, however, all agreed—that the average life of reset poles is less than that of new poles. From the answers received, and from the laboratory's observations in general, it would appear that there are several possible factors working singly or together to bring about this result, among them the following:

1. In rotting off the original pole at the ground line the fungus may extend some threads considerably above the ground line. The threads would make very little progress in rotting the pole at that level because of insufficient moisture, but they would be in excellent position for rapid development and extension whenever moisture conditions became more favorable. Cutting off the butt and resetting the pole would provide the favorable conditions. Moreover, in many cases the extent of primary deterioration is no doubt much greater than casual examination might lead one to believe.
2. When the reset pole is dropped into the old hole it is consigned to a veritable hotbed of infection.
3. The natural chemicals of cedar and other durable woods which help them to withstand decay may leach out or volatilize to some extent during the long exposure before the pole is reset, thus leaving the wood of the reset pole less resistant to the wood-destroying fungi.
4. Early removal of the reset pole may in some cases be due to its having been cut too short, so that adding another cross-arm or making other changes or improvements in the line may render it obsolete before it has been destroyed by decay.

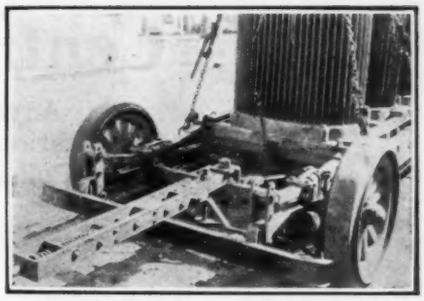
The actual length of life to be expected from the pole after resetting varied considerably in the estimates. One company reported an average of two to three additional years from reset poles which had already given fifteen years' average life. Another company in an adjoining state reported that the extension of life varied from as low as three years to as high as fifteen years, depending largely upon soil conditions and the condition of the pole at the time of resetting. The average added life was believed to be about eight years or a little over. Nearly half of those reporting expressed the belief that the reset poles would last approximately half as long, on the average, as the original poles. Of the remainder, one or two estimates were higher than this, but all the others lower. It is doubtful whether an exact average of all these estimates, if found, would be of much value. If, however, it be assumed that the various estimates are approximately correct for the localities represented, it is to be inferred that untreated reset poles usually give a life of one-quarter to one-half of the life of the original pole. One company, operating in a large city, requires that all old poles be carefully inspected upon removal and only those reset whose condition is good enough to indicate a probable life of at least half that already given.

A number of the companies reported it as their practice to clean off the pole thoroughly and give it a brush treatment with coal-tar creosote before resetting it. In this way they are able to gain two or three years more than if they reset without treatment. This gain should much more than repay the cost of treating. A dry, weathered pole is usually full of fine checks and otherwise in excellent condition to receive treatment. It is likely that a more thorough treatment would give much better protection, but it is not likely that this will be practicable in many cases because the poles are scattered and it would be expensive to bring them to a central treating plant and redistribute them afterward.

Heavy Duty Trailer Built by Power Company

TRANSPORTATION of heavy equipment required in the construction of power lines, substations, etc., is handled by the San Joaquin Power & Light Company with a 10-ton heavy duty trailer built in the company's shops at Fresno, Cal. As shown in the accompanying illustrations, it is of the four-wheel type, equipped with heavy artillery-type wheels with regulation-size rubber tires.

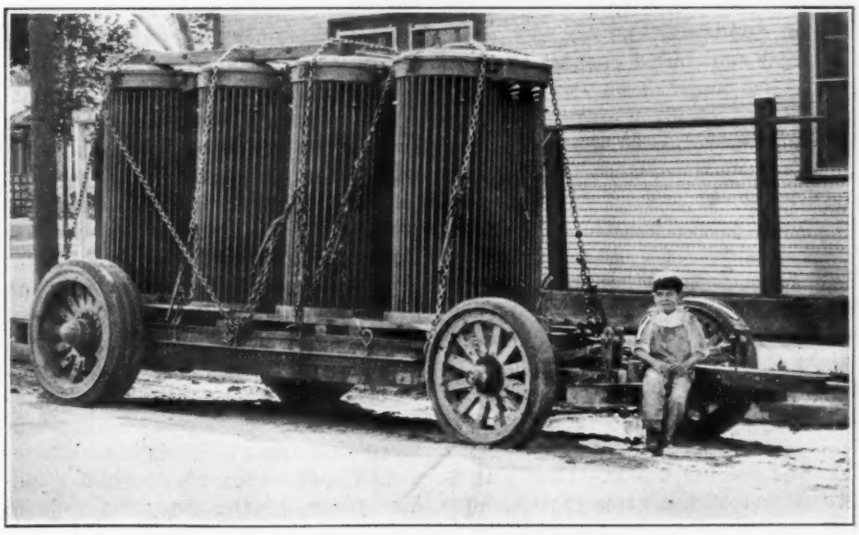
The rear wheels are provided with brakes operated by means of a hand lever at the front of the trailer. This permits use of the trailer in the mountains and relieves the strain on the brakes of the towing truck. An interesting feature in the construction of the trailer is the method by which the frame is fastened to the axles in order to obtain as low a center of gravity as possible. This also makes it easy to load and unload heavy equipment, a feature very useful and necessary in handling large transformers which weigh from 8 tons to 10 tons.



SPECIAL MOUNTING OF FRAME GIVES LOW CENTER OF GRAVITY AND FACILITATES LOADING AND UNLOADING

The side members of the frame are attached to the lower side of the rear axle and are held in place by a channel-iron saddle the width of the frame and secured by U-bolts. The front axle is attached to two standard front springs which are connected to the frame by means of a spring shackle.

The use of a trailer of this sort allows heavy equipment to be taken along with the crews as they go to the jobs and makes it possible for the job to be handled with only one truck, whereas without the trailer at least two would be necessary to accomplish the work.



LOW-BED HEAVY-DUTY TRAILER SAVES USING TWO TRUCKS

Central Station Business

Advertising, Selling and Service Methods
Commercial Organization and Management, Customer and Trade Relations, Public and Financial Policies, and Reports of Company Plans and Experiences

Employees as "Members" of the Company

INASMUCH as whatever adds to the prestige of an individual has a direct effect on those with whom he comes into contact, the Oklahoma Gas & Electric Company, under the guidance of J. F. Owens, vice-president and general manager, has adopted the policy of referring to its employees as "members" of the company or of one of its departments. It is believed that this description enhances the importance and responsibility of an employee in the eyes of customers and predisposes them to be friendly in their attitude.

In an address to each employee as an individual the company says: "You are a member of the firm, a member of the business, and upon you rests a share of the responsibility of seeing to it that you do your level best in performing those special little services that create a better spirit outside the company and lend more dignity to every member of the organization."

"Junior Partners" Featured in Customer Ownership

DESIRING to foster the family spirit among its customer stock owners, the Southern California Edison Company, Los Angeles, early this year sent out a request through its publication, *Edison Partners*, for pictures of children owning Edison stock. According to the records of the company there were 1,450 minors owning stock, and it was the plan to present group pictures of some of these children in a subsequent issue. The request said that the pictures were wanted in order that the older members of the "Edison family" might know what the younger generation looked like.

Immediately following the announcement pictures began to pour into the editor's hands. Each photograph carried the name of the child, together with the address of the sender. A total of 250 pictures were received during the time that elapsed between the announcement and the time of the next issue. Only six of them arrived too late to be included in the group.

Four pages of the last issue of the company's magazine were devoted to the pictures of the children, a total of 244 pictures appearing. The first page of the issue presented a story concerning the "junior partners" and called attention to the large number of children who already owned stock in the company. Upon receipt of each picture, a personal letter was sent to the parent of the child expressing appreciation of his or her co-operation. After the pictures had been published in *Edison Partners* a print of the four pages containing them was mailed to each parent.

Many very cordial letters were received from the parents of the children, and the company feels gratified with the results of its efforts to further a family spirit and to stimulate interest in its "junior partners."

Educating Grade and High School Pupils in Public Utility Subjects

How a Central Station's Prize Essay Contest Resulted in Forming an Educational Committee of Five Utility Groups to Give Lectures Before Civics Classes

BY F. W. FISHER
Manager Employment and Claim Department,
Rochester Gas & Electric Corporation

EARLY last year the Rochester (N. Y.) Gas & Electric Corporation began two educational movements which it believes have been of profound importance to itself, the local public, the industry and society in general, in that they both relate to the education in public utility matters of the growing youth in this community who will be this company's customers, stockholders and employees within a few years.

The first movement which was satisfactorily completed consisted of a prize essay contest. This was something of an innovation in advertising circles. It caused much favorable comment locally and achieved more than mere publicity in broadening the understanding and appreciation of the company's work and service in Rochester and vicinity.

The contest consisted of prizes to school children for essays on the company and its business. Twenty-six large illustrated display advertisements, each telling the story of a specific phase of the company and its work, were run in all Rochester newspapers over an approximate period of nine weeks. The co-operation of management, officers and employees was utilized to insure the accuracy of these stories, and an artist helped effectively to make them attractive in appearance.

School children of Rochester and vicinity, as specified in various classes according to age, competed for cash prizes totaling $1,245 in an essay on the subject "Rochester Gas & Electric Corporation—What It Is and What It Does." Prizes were awarded on the basis of the knowledge of the advertising copy circulated, which comprised an accurate story of the gas and electric industries, the company, its plants, organization, policies and problems which must be solved.

TEACHERS AND PARENTS BECOME INTERESTED

Through this contest much interest was aroused in the public school classes, while teachers and parents

showed a fine appreciation of the opportunity it presented to become acquainted with the company. During its period of operation many letters and personal calls received by the educational department testified to the general interest manifested. As a result much advertising and publicity in addition to the advertisements were disseminated, and a fine opportunity was presented for personal contact with those who seemed eager to become better acquainted with their local power and lighting utility.

In appreciation of the interest and enthusiasm displayed by the many children who wrote essays, the company gave them a party at which the prizes were distributed. Vaudeville, luncheon and motion pictures were features, and a further opportunity was given to become acquainted with parents, teachers and children. A motion picture of the prize distribution by R. M. Searle, the company's president, was taken and later shown in one of the local theaters. The prize essay was printed in the company's monthly publication, *Gas and Electric News*, and in the newspapers.

The second educational movement is as yet unfinished and will probably never be completed as it bids fair to continue indefinitely. It forms a corollary of the beginning made by the prize essay contest and consists of public utility lectures to civics classes in the Rochester high schools.

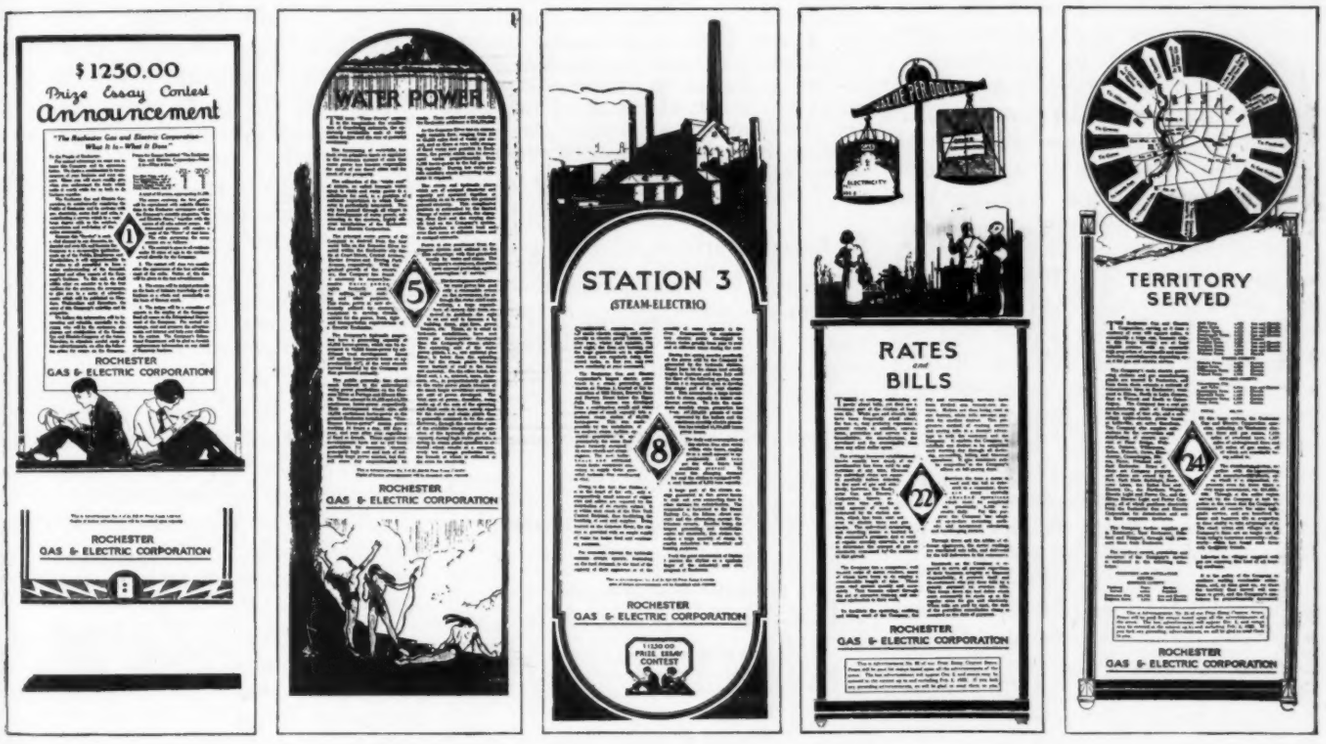
UTILITY MEN COMPOSE EDUCATIONAL COMMITTEE

It has been a part of the regular educational program of the Rochester city high schools for many years to teach general civics. This work has been amplified this year, at the initiation of this company, by the addition of supplementary public utility lectures. This company was instrumental in combining for educational purposes all the public utility interests which operate in this city, together with the city administration. Responsible representatives from each have been combined into an educational committee, which in turn has subdivided its work among five subcommittees as follows: (1) Gas and electric utility group; (2) steam-railroad utility group; (3) electric railroad utility group; (4) telegraph and telephone utility group; (5) municipal utility group.

These groups embrace the following organizations: The city of Rochester, the New York Central Lines, the Buffalo, Rochester & Pittsburgh Railway, the Erie Railway Company, the Pennsylvania Railroad Company, the Lehigh Valley Railway Company, the New York State Railways, the Rochester, Lockport & Buffalo Railway, the Rochester Telephone Company, the Postal Telegraph Company, the Western Union Telegraph Company and the Rochester Gas & Electric Corporation. Each of these groups has prepared or is preparing an illustrated lecture or motion picture film concerning its own particular utility with special reference to its work in Rochester. Up to date the Rochester Gas & Electric Corporation and the steam railroad utility group are the only ones which have actually delivered lectures. These lectures were presented before the full high-school assembly made up of the pupils of the civics and history classes, some 1,100 students.

This educational work is so well thought of by the school authorities that at their request the committee has engaged the services of a Rochester publicist of prominence who will prepare a comprehensive textbook on public utilities which will form the basis of public utility instruction in the civics classes in the Rochester high schools in the future. This textbook will be sufficiently general to be used in other cities. Its presentation of the public utility subject will be amplified, in so far as Rochester is concerned, by the lectures mentioned.

To bring the best possible modern interpretation of the electric and gas



PART OF SERIES OF INFORMATIVE ADVERTISEMENTS WHICH WERE MADE THE BASIS OF ESSAY CONTEST CONDUCTED BY THE ROCHESTER GAS & ELECTRIC CORPORATION

industries as operated in Rochester before the school pupils, this company has in preparation a strictly first-class motion-picture film to show its own work. This film will contain animated drawing features to illustrate the scientific principles of the gas and electric industry and will show the actual operation of the company's plants, together with the application of its products.

SCHOOLS PRESENT ELECTRICAL PAGEANT

As further evidence of the satisfaction with which this work has been received by the school authorities, one of the largest high schools has, on its own initiative and with some help from this company, presented a pageant to illustrate the development and utilization of electricity in general with special reference to its use in Rochester and with particular reference to the historic developments in the lighting and home application thereof.

It is the belief of this company's management that the development of its educational work in connection with the prize essay contest and the lectures on public utilities in the high schools has done more to place the company in the proper light in so far as the public is concerned than anything else so far attempted. While the work is in some respects in an embryo stage, it has, we believe, cumulative possibilities of great importance. This work, together with the selling of company securities to customers and to the general public, will go further toward creating good public feeling, toward holding down municipal ownership propaganda and toward solving the serious financial problems with which all public utilities are confronted, owing to their unprecedented expansion, than anything which has yet been done along these lines.

Employees Urged to Sell Company's Service

A LETTER recently addressed to all employees of the El Paso (Tex.) Electric Railway by Alba H. Warren, general manager of the company, is typical of the activities of many central stations to encourage the full co-operation of their employees in promoting the prosperity and welfare of the companies. The letter read:

Every company, firm or corporation is essentially a merchant. Your company is engaged in the merchandising of two great necessities—electricity and street-railway transportation. Every employee of the company is a salesman, a representative in some capacity. Each of you can assist in expanding the company's business, some more than others, perhaps, but each to a degree. You can do this by encouraging your friends to use the street cars more, their automobiles less, with benefit to their pocketbooks—by encouraging them to use the many labor-saving and comfort-giving electrical appliances which are available at a reasonable cost.

In this connection I wish to advise you that the company has placed in effect a liberal partial-payment plan whereby electric ranges and appliances may be purchased on easy terms, monthly payments being made with the lighting bills. Thus has it been made possible for every one to obtain in a convenient way these useful devices which mean so much to the housewife.

Your fullest co-operation is earnestly requested in the extension of the market for your company's commodity, electric light and power service and street railway transportation.

A Bona-Fide Cut-Price Sale

THOUGH central-station companies generally have been severely criticised for cutting the prices on electrical appliances and thereby creating a condition of unfair competition with other electrical dealers, there can be no objection to a company's offering at special prices appliances which have become shopworn or are slightly used. The accompanying advertisement shows how the Cambridge (Mass.) Electric Light Company announces its sale of slightly used appliances. This company makes a practice of cleaning out its stock of shopworn or used devices periodically, and once every six months or at most once a year it advertises such a sale. All appliances so sold are backed up by the company's guarantee, and, except for the fact that they have been on trial or have been marred in some way, they are equal to new appliances. By this means the company is able to keep its stock of devices fresh and new at all times, while it also tends to increase the rate of turnover and precludes the possibility of building up a heavy investment in dead stock.

A Sale of
Slightly-Used Appliances
At Bargain Prices
We have a number of appliances which have been used in demonstrating, and others which have not been used at all, but are merely slightly shopworn.
These appliances are as good as new in every respect except that frequent handling has marred their finish.
Every Appliance is in Perfect Working Order
In order to clear our stock, we offer these appliances at greatly reduced prices. Among them are Washing Machines, Ironing Machines, Electric Cookers, Toasters, Waffle Irons and other appliances.
These appliances may be seen at our Showroom, 8 Brattle Street. We have but a few of them, and at the prices offered
EVERY ONE IS A GENUINE BARGAIN
Telephone at once. They will go quickly.
Cambridge Electric Light Company
8 BRATTLE STREET CAMBRIDGE
Telephone, University 6799

ADVERTISING SALE OF USED APPLIANCES

What Other Companies Are Doing

El Paso, Tex.—Results of a merchandising campaign being waged by the El Paso Electric Railway Company have been very encouraging. Several appliance campaigns have been put on and others are contemplated. The company is seeking the co-operation of its employees in its load-building program. A recent cooking school conducted by a range manufacturer has done much to stimulate interest in electric cooking, and many range sales have resulted.

Orion, Ill.—The Sherrard Power System has installed a public electric cooking stove at the Country Club grounds. The stove is housed in a kitchenette which will be open to any visitor wishing to cook a meal or luncheon.

Salinas, Cal.—One hundred per cent attendance marked the first meeting of the women's public information committee of the Coast Valleys Gas & Electric Company, which was held here recently. Sixteen women, three district managers and the general manager of the company were in attendance at the first gathering of the committee, over which Mildred Hinrichs, representative of the women's public information committee of the Pacific Coast Electrical Association, presided. During the evening short talks were made to the women by H. M. Buck, manager of the Monterey district of the company, on "Co-operation"; by C. M. Armstrong, manager of the King City district, on "Service from the Consumer's Standpoint"; by P. S. George, manager of the Salinas district, on "Service from the Company's Standpoint," and by James F. Pollard, general manager of the company, on "Relation of the Company to the Employees."

Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
from All Parts of the World

Photostat copies or English translations of complete articles will be furnished at cost upon request

Hydro-Electric Development and Steam Equipment

Construction of Boiler Settings in Devon Station.—The furnace walls for the 16,800-sq.ft. boilers of the Devon station of the Connecticut Light & Power Company are constructed entirely of firebrick. Arches are built in the walls to relieve the loading on the brick. Expansion joints filled with asbestos fiber divide the walls into vertical sections and allow for horizontal expansion. Vertical expansion is taken care of by expansion joints under the relieving arches and at the lower tube line. No heat-insulating bricks are used below the lower tube line.—*Power*, May 13, 1924.

Maximum Operating Efficiency of Power Units in Parallel.—A. P. STROM.—Water rates of individual units are plotted on a combined chart showing the total water rate for any combination of units for various loads. The most efficient combination of units can at once be determined by reference to the chart. These charts that are given in the article serve equally well for distribution of the load throughout several hydro-electric plants.—*National Engineer*, May, 1924.

Research in Heat Transmission.—E. BUCKINGHAM.—Conduction, radiation and convection, conduct of research in heat transmission, employment of dimensional analysis, variables involved in complete mathematical theory of heat transmission and suggestions in regard to the planning of research programs are among subjects considered in this extensive paper.—*Paper presented before the A. S. M. E., Cleveland*, May 27-29, 1924.

Generation, Control, Switching and Protection

High-Pressure Turbines.—The increasing use of high pressures with a view to improving the efficiency of power plants has led one European manufacturer to develop special turbines. Whenever high pressures and temperatures are employed a large heat drop has heretofore been allowed in the first stage. In this way a rapid drop in pressure and temperature is obtained, but with very high pressures this practice results in a falling off in efficiency. It is shown that this difficulty can be overcome by utilizing separate units for the high-pressure and low-pressure portions of the turbine. A turbine of this type is described.—*Engineer (England)*, May 2, 1924.

Load Control in Automatic Hydro-Electric Generating Stations.—R. C. DENNY.—The automatic or semi-automatic operation of hydro-electric generating stations and the proper adjustment of load to correspond with water conditions are probably the most difficult, if not the most important, single accomplishment. Various methods of control are discussed and described by the author.—*Power*, May 6, 1924.

Power Organization in the Steel Industry.—B. BANNISTER and F. M. VAN DEVENTER.—The authors show by comparison that the value of the fuels used and the complexity of problems incident to the operation of the power system of representative steel works are of greater magnitude than for a representative central station. They contend that these facts warrant a steel company in its employment of a highly qualified power department organization. The paper describes such an organization and enumerates the benefits which it would bring.—*Paper presented before the A. S. M. E., Cleveland*, May 27-29, 1924.

Transmission, Substations and Distribution

High-Tension Transmission Lines.—ERNEST V. PANNELL.—A series of six articles of twelve 11x16-in. pages dealing with the subject of high-tension transmission lines and illustrated by twenty-six line drawings. The author primarily investigates the purely engineering elements of the transmission line. The electrical problems associated with the subject are not treated except where they react in a definite manner upon mechanical design. So far as it is necessary to refer to a concrete illustration, the author assumes that the mechanical design relates to double-circuit construction capable of operating at 150 kv. and carrying 40,000 kw. per circuit with a reasonable amount of synchronous apparatus on the network over a maximum distance of 150 miles. The mechanical elements are adaptable for a wide range of conditions beyond those stated above, but the figures represent simply a focus for certain numerical illustrations. For the ready analysis of the physical elements of line construction the author groups them into three classes—conductors, insulators and supports, which he treats separately in this order. He then studies the general subject of mechanical design and follows with a survey of construction economy.—*Engineer (England)*, March 14 to April 18, inclusive, 1924.

Cleaning Dirty Insulators.—A short article describing a method of cleaning insulators. The cleaning device consists of a double tank, brick-lined on either side and provided with a coal-fire grate underneath. The tank is filled with water, together with an admixture of quebracho extract and caustic soda in the proportion of three to one. Four pounds of mixture is used in about 24 gal. of water. The insulators should be allowed to remain in the slowly boiling liquid for twenty minutes, after which they are transferred to the second tank, which is half filled with warm water. If the chemical action in the first tank has not entirely removed the dirt, a wet sponge or cloth may be used in the second tank. The insulators are then rinsed in clear, cold water and placed on racks to dry.—*Electrical Review (England)*, May 9, 1924.

Automatic Substation Equipment for Industrial and Power Systems.—CHESTER LICHTENBERG.—An expansion of a paper on the industrial situation delivered at the Birmingham convention of the A. I. E. E. this spring. It describes the advantages of such equipment and outlines its superiority with respect to the quality of service and economy of operation it effects.—*General Electric Review*, June, 1924.

Units, Measurements and Instruments

Power-Factor Tariffs.—E. W. DOREY.—The author gives details of the kind of power-factor tariffs in force and metering equipments used in connection with such tariffs. The system of charging that is most in favor and which gives the least amount of trouble to the consumer is the two-part system of kilovolt-ampere maximum demand and running charge per unit.—*Electrician (England)*, May 2 and 9, 1924.

Resistance and Temperature Coefficient of Iron Wire.—S. KIMURA and N. NAMIKAWA.—The resistance, temperature coefficient and specific gravity were determined for thirty-five kinds of telephone and telegraph wire, the impurities of which were carefully analyzed. This was done to find out the effect of impurities on the resistance of the wire. In addition to this, the effect of zinc coating on the three properties mentioned above, the relation between resistivity and the temperature coefficient, microstructure and mechanical properties were investigated.—*Research No. 132, Electrotechnical Laboratory, Tokio, Japan.*

Specific Heat of Steam.—H. L. CALLENDAR.—The majority of recent advances in knowledge of the properties of water and steam have been effected by the adoption of steady-flow methods of calorimetry coincident with electric heating. It is possible to determine the variation of the total heat with pressure and temperature for superheated steam independently of the latent heat condensation. The author explains the principles of the new methods of research and illustrates some of the difficulties encountered in the neighborhood of saturation, which have led to the abandonment of many of the older methods. Commencing with an explanation of the energy equation for a fluid in steady flow, he passes on to a review of the throttling calorimeter and the electric calorimeter and then explains in full the varying methods, both old and new, of research into the specific heat of steam.—*World Power (England)*, May, 1924.

Electrometer Tests in Flotation.—T. M. BAINS, JR.—Experiments to date have indicated the advisability of further work and investigation on electrostatic charges. According to the author, tests should be made on a great many oils, reagents and minerals in

order to obtain sufficient data to determine that the electrometer method is of practical value.—*Engineering and Mining Journal-Press*, May 31, 1924.

Disruptive Strength of Solid Dielectrics. — A. A. AHMED. — The author gives details of an investigation of electrode spacing in the distribution of electric stress near the surface of a finite plate electrode, the results being shown graphically. Stress-distribution curves mapped out in this manner provide an explanation of certain experimental data relative to the variation of disruptive strength with thickness of insulation material. The apparent disruptive strength is shown to be influenced in a large degree by the edge curvature of the electrode, the results given emphasizing the necessity of specifying a standard radius of curvature for the edge of the plate electrode. A radius of 0.25 cm. is advanced as possible the most suitable value for this radius—*World Power (England)*, May, 1924.

Motors and Control

Control of Auxiliary-Drive Motors. —A. L. HARVEY.—Automatic regulation of motor speed, control of stoker drives, use of two motors for driving forced-draft and induced-draft fans and automatic change-over from one source of power to another are among the specific subjects discussed.—*Power*, May 13, 1924.

Damping Effect of Solid Rotors.—N. B. HILL.—The author develops the circuit equations during the transient period after making or breaking the field circuit of a rotor as an examination of these leads to alternative methods of measuring the equivalent resistance of the body circuits. To keep these equations as simple as possible, it is assumed that there is no leakage between the equivalent damping winding and the main field winding and that the stator winding is on open circuit. The machine may either be running or at standstill.—*Electrician (England)*, May 25, 1924.

Electrification of Sugar Mills.—C. A. KELSEY.—The engineering features in the development of electric drive as applied to the sugar industry in Cuba are considered.—*General Electric Review*, June, 1924.

Heat Applications and Material Handling

Economies of Electric Heat in Metallurgical Processes.—D. D. MILLER.—The author deplores the decided tendency of resistance to any innovation or change in existing practices involved in the introduction of electrical heat in metallurgical and various other industrial processes. This resistance seems to be due primarily to the high cost of these processes, and the author devotes his paper to a discussion in which he attempts to prove that the supposed high cost of heating is erroneous, since there are many other factors entering into the problem which actually bring the cost below that of any other method. He gives several examples proving his case and cites the more conspicuous advantages resulting from the application of electricity in this field—*Iron and Steel Engineer*, March, 1914.

Electric Mine Hoist.—Recently two 1,950-ft. hoisting installations have been installed at a large coal mine in South Wales, Great Britain. Each hoist has a capacity of handling 250 tons of coal per hour, working at the rate of fifty hoists per hour. Each installation consists of one direct-current winding motor directly coupled to the drum shaft and having a continuous rating of 1,400 hp. at 600 volts and 51 r.p.m., one motor-generator set, autotransformer starters and direct-current and switch control. The control system that has been adopted is of the Ward Leonard type.—*English Electric Journal*, April, 1924.

Electrophysics, Electrochemistry and Batteries

Acidity of Cobalt and Nickel-Plating Baths.—G. H. MONTILLON and N. S. CASSEL.—A possible explanation is given for the failure of the hydrogen electrode in the direct measurement of hydrogen-ion concentration in nickel and cobalt plating baths. The oxygen electrode gives approximate hydrogen-ion concentration values, which are useful for controlling acidity in these solutions. For the plating baths used a pH of 6 gave the best current efficiencies and the most desirable plates. Further work is needed to establish the accuracy of this method.—*Paper presented before the American Electrochemical Society, Philadelphia*, April 24-26, 1924.

Repair by Electrodeposition.—J. P. MCLARE.—The application of electrodeposition to the repair of worn parts of machinery was conceived during the late war. Very good success has been had in this process when alternate layers of copper and iron are deposited. Another method has also been used in which nickel is deposited. A description of the various processes and methods of cleaning the materials are described.—*Electrician (England)*, May 16, 1924.

Electrical Smoke Filtration. — ÅKE DAHLGREN.—The author gives a historical review of the development of the art of smoke filtration and a detailed description of the electrical method proposed by Cotrell and later improved upon by Möller. A number of photographs and figures are given showing recent installations in Europe.—*Teknisk Tidskrift (Sweden)*, May 10, 1924.

Telegraphy, Telephony, Radio and Signals

Critical Frequencies of a Series Electric Circuit.—H. H. RACE.—The author considers the frequency condition in an electric circuit composed of resistance inductance and capacitance. He also considers the critical frequencies of this same circuit, which gives a maximum voltage across the resistance, maximum power dissipated in the resistance, maximum voltage across the inductance, maximum energy stored in the inductance, maximum voltage across the capacitance and maximum energy storage in the capacitance. He compares these values with the natural frequency of free damped oscillations of such a circuit.—*Sibley Journal of Engineering*, May, 1924.

Design Characteristics of Electromagnets for Telephone Relays.—D. D. MILLER.—The electromagnets described are confined to relays, although the principles involved apply as well to selector magnets, clutch magnets and electromagnets in general. A treatment from the viewpoint of the telephone engineer is given of the important considerations which determine the design of the magnetic parts of relays and the economics of the winding dimensions. A knowledge of these factors as well as of the general considerations which are discussed is of great importance in the selection and application of relays to the telephone system.—*Bell System Technical Journal*, April, 1924.

Physical Characteristics of Speech Sound.—M. H. LIDDELL.—The extension of the range of telephonic communication to transcontinental and transoceanic distances and radio broadcasting have brought to new importance the study of the basic characteristics of speech sound. The new conditions justify a rigid examination of speech sound from every angle, especially as regards these elements or factors which make for correct understanding. The author's fifty-six-page bulletin on the subject gives the results of more than two years' intensive and devoted work in this new field. Vowel analysis, the difference between spoken vowels and sung, intoned vowels, harmonic analysis of tone, etc., are among the specific subjects treated.—*Bulletin No. 16, Engineering Experiment Station, Purdue University.*

Miscellaneous

Mathematical Theories for the Breakdown of Solid Insulation Material.—L. DREYFUS.—There are three fundamentally different methods to explain the breakdown of solid insulation material: (1) By conceiving the phenomenon as a purely electrical one. This defines the breakdown as a dissolution of the molecular structure. The dielectric strength is then given in terms of field strength. (2) By considering the phenomenon as one of heat transmission and dissipation. The breakdown is then characterized by the fact that a condition of thermal equilibrium cannot be reached without dissolution of the molecular structure. (3) The dissolution of the molecular structure is attributed to the combined effect of the electric field and the heat. The author states that the first one of these methods has been proved fallacious by the fact that the time element plays such an important rôle in insulation tests. The two remaining methods must both be based upon the fundamental laws of heat transmission and diffusion. The present paper is an extensive discussion of the mathematical theory for the second conception of the phenomenon and, consequently, represents a criticism of the Wagner canal theory (see *A. I. E. E. Transactions*, 1922). — *Teknisk Tidskrift (Sweden), Elektroteknik*, May 3, 1924.

Scientific and Industrial Research

A Department Devoted to Reports of Investigations Contemplated or Completed, Research Facilities Available and Suggestions for Co-operative Work

Conducted by PROF. VLADIMIR KARAPETOFF, *Cornell University, Ithaca, N. Y.*

[PRINTED IN THE THIRD ISSUE OF EACH MONTH]

[When investigations which have been completed are, in the opinion of the editors, of wide enough interest to the field we serve, details thereof will be presented in other parts of this paper. Contemplated research or that which appears to have limited appeal will be only briefly reported in this section, but details may be had by communicating with the investigator or institution named in the report. Readers are referred to the department "Digest of Electrical Literature" for investigations reported in other journals. The news and engineering sections should also be followed for research reported before technical societies.]

Research Completed

Bridge for Measurement of Small Phase Angle of a High Resistance

An alternating-current bridge has been developed for measuring capacities of the order of a microfarad to within a few per cent when they are in series with 100,000 ohms or less. The action of the bridge depends on the addition of a fourth low-resistance arm in addition to the usual Wagner arm. This makes possible a new method of adjustment of the Wagner arm which, with a vacuum tube as detector, allows the elimination of distributed capacity and inductance and earth capacity in the adjustable arms of the bridge and of earth capacity effects in the object to be measured.—*Irving Wolff, Cornell University, Ithaca, N. Y.*

Converters, Rotary, High-Reluctance Commutating Poles in

The reluctance of the path of the commutating flux can be increased in different ways, the simplest method being to introduce a piece of non-magnetic material between the base of the commutating pole and the main frame. With this arrangement a much higher magnetomotive force is required to maintain the proper commutating flux, and the energy stored in the interpole circuit is increased accordingly. Hence, under disturbances, transient conditions, short circuits, etc., the initial commutating flux varies more slowly and insures better commutation.—*David Hall, Pittsburgh, Pa.*

Current-Measuring Instrument of Extreme Sensitivity

The charged particles of an ionized gas are attracted to or repelled from the plates of an ionization chamber. Air currents are set up within the ionization chamber when this action takes place. This circulation phenomenon, commonly called "electric wind," is employed to move the vane of a suspension system. The plates of the ionization chamber are perforated with numerous holes. Suitable passages are provided in order to cause the air currents from the ends of the ionization chamber to impinge upon a vane and thus twist the suspended system. Alpha rays from polonium are used to produce the ionization. It is essential that the conditions of ionization be such as to insure operation on the straight part of the saturation curve. The instrument has a sensitivity much higher than that obtainable with any type of galvanometer.—*Roy Kegerreis, Mayo Clinic, Rochester, Minn.* [The same principle of construction may possibly be adapted for extremely high-voltage measurements by making use of similar circulation phenomena in insulating fluids.—EDITOR.]

Insulator, Suspension, of High Mechanical Strength

The high-strength suspension insulator was designed after a thorough study of the mechanical stresses as developed under higher load. The ultimate strength of the standard type of suspension insulator has practically been depending upon cement under shear. With the special-shaped head and proper taper of the head the forces are transmitted at an angle placing the cement and the porcelain under compression. The cap is provided with a strong lower rim so as to take up the load without developing expansion forces as these would be detrimental under a combined electrical and mechanical test.—*Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.*

Photometric Disk of Variable Aperture

Two sectored disks are placed side by side and revolved by identical synchronous motors. One of the disks can be shifted with respect to the other either by turning the stator of one of the motors by a desired angle or by changing the electrical constants of its circuit.—*Enoch Karrer, Nela Laboratories, Cleveland, Ohio.*

Relays, Operation Indicator for Disturbances in

An operation indicator has been developed which shows which relays have operated during a system disturbance. It aids in adjusting the operation of the relays, in locating the cause of the disturbance and in fixing the responsibility for it.—*Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.*

Synchronous Motors, Dynamic Braking of

The dynamic braking is obtained in a manner exactly comparable to that used on direct-current motors and brings the motors to a quick but easy stop without shocks. In a particular installation the 250-hp. motors make only a little more than two revolutions in dropping from 600 r.p.m. to zero speed. This method of braking is more accurate than mechanical brakes and imposes smaller mechanical stresses on the machinery.—*Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.*

Turbine Trips, Overspeed

Two turbine manufacturers have developed apparatus to enable the dependability of the overspeed trip to be tested at speeds lower than that at which the trip is normally to function. These devices also make it possible to place the machine back in service after a trip-out without the necessity of first waiting for it to fall below synchronous speed.—*Prime Movers Committee of the N. E. L. A.*

In Progress or Purposed

Insulating Paints and Varnishes, Thermal Conductivity of

A coat of insulating paint or varnish of uniform thickness is put on a copper tube along the axis of which an electric heating element of high resistance and zero temperature-coefficient resistance wire is wound helically on a pyrex tube. With constant temperature maintained at the paint surface, the temperature gradient across the paint thickness is measured by means of thermocouples and bridge methods, and the conductivity is calculated from the electrical energy supply, the constants of the system and the temperature gradient.—*M. P. Weinbach and R. J. Bennington, University of Missouri, Columbia, Mo.*

Lightning Frequencies

It is proposed to determine the range in frequency of lightning discharges, so that the impedance of any given circuit to lightning may be calculated. A photographic method will be used in which images of each oscillation will be recorded so that the interval of time between them may be calculated.—*A. H. Forman, West Virginia University, Morgantown, West Virginia.*

Magnetization and Hysteresis in Permalloy

Nickel-iron alloys containing 65 and 84 per cent of nickel show opposite effects of tension on magnetization. An alloy containing 81 per cent of nickel is nearly indifferent to tension. Whenever magnetization is favored by tension the hysteresis loss is diminished. In an especially well-annealed alloy containing 78.5 per cent of nickel both effects are enormous, hysteresis in particular being reducible to about one hundredth of its amount in the best silicon steel.—*O. E. Buckley, American Telephone & Telegraph Company, New York City.*

Phonometer, Hot-Wire, Characteristics of

The resistance of a platinum wire mounted in a horizontal slit over a brass tube and heated by a current of electricity is changed by a sound wave passing through the slit. In this experiment the change of resistance was measured by a potentiometer. The relation between intensity of sound and change of resistance was determined by mounting a calibrated telephone receiver over the apparatus and operating the receiver by a filtered current from a vacuum-tube oscillator. For any given frequency a linear relation was found between the change of resistance and the square of the amplitude of the receiver diaphragm.—*Orin Tugman, Riverbank Laboratories, Geneva, Ill.* [A phonometer is a device for measuring the intensity of sound. Such devices are becoming of increasing practical importance.—EDITOR.]

Radio, Line, for Mine Rescue Work

Development of a line-radio or "wired-wireless" system, by which trolley wires, mine tracks, compressed air and water piping, cables and similar "carriers" are utilized for voice-transmission purposes, promises the solution of the difficult problem of establishing methods of communication between underground mine workers and the surface. This system will be reasonably sure to withstand the severe disturbances occasioned by mine explosions.—*J. J. Jakosky, Pittsburgh, Pa.*

Suggestions for Research

Flue-Gas Temperature Measurement

Numerous flue-gas temperature-measuring devices have been tried without final determination of dependable accuracy. Mercury-averaging and gas-type instruments, as well as instruments equipped with an electrical transmitting device between the thermometer and the recorder, have been installed, but their accuracies are as yet unknown.—*Prime Movers Committee of the N. E. L. A.*

Lighting, Its Effect Upon the Eye and the Mind

We have reached the stage where the most urgent need in the development of lighting is a more precise and practical knowledge of its effects upon the eye and mind, and through them on all our activities.—*E. C. Crittenden, Bureau of Standards, Washington, D. C.*

Synchronous Machine, Load Angle of

For each load and field current of a synchronous generator or motor there is a load angle at which the field structure is displaced with respect to its position at no load. This angle is an important element in checking the armature reaction, the synchronizing torque, etc., and it is desirable to be able to measure it directly. One possible method is to run another synchronous motor at no load and to provide instantaneous contacts on the shafts of both machines. These contacts are to be connected in series with a telephone receiver and a dry cell. When the machine is running at no load the two contacts are set to be closed at the same instant, causing a noise in the receiver. When the machine is loaded it is necessary to shift one of the contacts by an angle, corresponding to the load angle, to restore the noise.

Welding, Use of Fluxes in

The knowledge of the use of fluxes in welding is in a very unsatisfactory state. Practices are based largely on the results of practical experience where the use of flux has been found to give results which have proved satisfactory in service. Very little scientific effort has been made to analyze the functions of the flux, their best composition, their best methods of application and the results attained from their use. It is believed by some that the use of flux will in some instances give better results than welding without its use. Test results are needed to substantiate these opinions.—*W. Spraragen, 29 West Thirty-ninth Street, New York City.*

News of the Industry

Chronicle of Important Events and General Activities, Announcements and Reports of Association Meetings, Court Decisions and Commission Rulings and News of Electrical Men

Tallapoosa's Six Dams

Cost of the New Power Sources Will Be $39,000,000—Primary Capacity of 90,000 Hp.

FROM now until the completion of the six hydro-electric dams on the Tallapoosa River for which certificates were recently granted by the Federal Power Commission to the Alabama Power Company construction work on the river will not cease, according to a statement made a few days ago by E. A. Yates, general manager of the company. The six dams include what is known as Cherokee Bluffs Dam, now in course of construction, which will be completed within three years from the time work was begun. The approximate cost of the six dams is $39,000,000.

The six dams will provide a total primary capacity of 90,000 hp. In addition to the power yield, Mr. Yates points out that upon completion of the project danger from floods in the Alabama River will be minimized and that the stream flow of its tributary, the Tallapoosa, will be so regulated that navigation to a depth of four feet from Montgomery to the Gulf will be made possible practically the year round.

The Tallapoosa is a stream having small capacity of "run-of-river" power but large storage possibilities which make it feasible to impound sufficient water during flood seasons to operate the plants during the dry season to carry the load of the "run-of-river" plants on the Coosa River and thus reduce, in a measure, the need for standby steam power. The same water will be set to work again and again, turning the wheels of each dam as it passes from one to another.

Cherokee Bluffs, largest of the projects, will be one of the largest power producers in the world. The 150-ft. dam will back the Tallapoosa into a lake having an area of 39,200 acres and containing sixty billion cubic feet of storage water available for power production. The initial installation here will be two units of 45,000 hp. each. Work has been in active progress at Cherokee Bluffs for a year, and the camp and railroad, together with the first cofferdam, are almost complete. A high-tension transmission line from Upper Tallassee has been connected to the dam site.

Cost May Reach $119,000,000

In addition to the six new dams, the Alabama Power Company has two other developments on the Tallapoosa below Cherokee Bluffs. One of these, the Upper Tallassee project, was placed in service on May 5 last and is delivering 7,800 hp. to the company's system. Good progress is reported at the lower project, at Tallassee Falls, and this development will also be completed and in service within the near future.

It is pointed out that, in addition to the $39,000,000 to be spent on the six new dams, an expenditure of approximately $80,000,000 will be necessary for transmission lines, substations and other equipment necessary in getting the power to the customers.

California Power Situation Acute

Curtailment of 25 per Cent in Supply Has Gone Into Force on System of Southern California Edison Because of Drought—Other Companies in Better Shape

BECAUSE of the combination of an unprecedentedly dry year and a tremendous increase in load California electrical utilities are faced with the most serious situation in their history. The Southern California Edison Company especially, on account of the extent of the territory it serves, has found it physically impossible to meet the demands for power and has ordered a 25 per cent curtailment of supply over its entire system. This curtailment became effective last Monday, June 16.

The order came as the result of a conference between executives and engineers of all Southern California electrical utilities and representatives of the California Railroad Commission held in Los Angeles on June 13. The meeting was called at the instigation of the Railroad Commission to consider steps to meet the emergency. Testimony at the hearing brought out the fact that there would be a shortage of 126,000,000 kw.-hr. on the Edison system during the last six months of the year, which would require a curtailment of approximately 20 per cent. Other utilities represented at the hearing showed that they would be able to meet the demands for power on their own systems and that in the case of several they would be able to furnish power to the Edison company to help relieve the situation on its system.

Power Supervisor Asked

A unanimous request was made by the utilities represented for the appointment of a power supervisor to assist in an intelligent distribution of the power that is available. The name of J. G. Butler, former chief of the Division of Water Rights of the State Department of Public Works, who acted as power administrator during the shortage of 1920, has been suggested for the position.

Unnecessary employment of electrical energy for floodlighting, display lighting and similar purposes will be discontinued first. Industrial consumers, street railways and municipalities will be asked to reduce their energy consumption to three-quarters of normal. The Los Angeles Bureau of Power and Light, the largest individual consumer on the Edison system, will receive a 25 per cent cut in its kilowatt-hour delivery and will be forced to allocate this among its own customers.

Other Utilities Affected

Other utilities of the section chiefly affected include the San Joaquin Light & Power Corporation of Fresno, the Midland Counties Public Service Corporation of Fresno, the Los Angeles Gas & Electric Corporation, the Southern Sierras Power Company of Riverside, the San Diego Consolidated Gas & Electric Company, the Ontario Power Company and the Ojai Power Company. Of these companies the Midland Counties Public Service Corporation, the Ontario Power Company and the Ojai Power Company purchase their main supply of power from the San Joaquin Light & Power Corporation or the Southern California Edison Company, and are included because any possible shortage in their wholesale supply of energy will necessarily affect their customers. The Los Angeles Gas & Electric Corporation and the San Diego Consolidated Gas & Electric Company generate electricity entirely in steam plants, but are included because power produced in their steam plants is available to the other companies through the interconnected systems. Municipal plants in southern California are also sufferers from the drought and were represented at the hearing.

Although the situation is acute also in northern California, the electric light and power companies in that section expect to be able to meet the demands for energy by rigid conservation without the necessity for enforced curtailment. Both in the south and the north the utilities are exerting every effort to cope with the deficiency caused by the drought. As already reported in the ELECTRICAL WORLD, every available kilowatt of steam capacity is being pressed into service, new equipment is being installed as rapidly as possible and many obsolete steam plants are being rehabilitated and placed in service. Full advantage of the interchange of power made possible by the

large interconnected transmission system of the state is being taken. No improvement in the situation is expected before November 1 or possibly later unless early fall rains replenish the water supply.

World Power Conference Delegates Sail

Calling to order several hundred delegates and engineers who had come aboard the SS. *Scythia* on June 18 to wish bon voyage to America's representatives to the first World Power Conference, which meets in London June 30 to July 12, F. R. Low, president of the American Society of Mechanical Engineers, introduced Henry J. Pierce, vice-president of the American executive committee of the conference. Mr. Pierce struck the keynote of the coming gathering when he stated that while many Americans might not favor a League of Nations, all were in favor of a league of some sort to further the economic development of the world's power resources.

Georgia Electrical Association Convention

The Georgia Electrical Association convened at the Biltmore Hotel, Atlanta, on June 18 and 19 with an attendance on 120, the largest in the association's history. J. E. Mellett presided. Features of the meeting were the addresses of P. S. Arkwright, president of the Georgia Railway & Power Company; J. O. Weatherbie of the General Electric Company, Bridgeport, Conn., and D. W. Atwater of the Westinghouse Lamp Company.

W. J. Sayward's talk regarding the necessity of a better understanding between the architect and the electrical industry, and the remarks of Robert Strickland, vice-president of the Fourth National Bank, Atlanta, regarding the financial problems of the electrical man were well expressed and met with a hearty response. Herbert Metz, advertising manager of the Western Electric Company, spoke ably on the subject of "Advertising and Good Will."

Mr. Arkwright criticised the past practice of electrical interests in putting service and appliances on the basis of bare necessities and urged that the industry as a whole get back of a co-operative effort to interest present and future customers in the convenience of electric service as well as its necessity. He suggested the adoption of a code of ethics by all electrical interests in an effort to convince the public of the industry's desire to render 100 per cent service.

M. L. Brittain, president of the Georgia School of Technology, spoke convincingly regarding the necessity of supplying technically trained men to meet the increased growth of the public utility business and emphasized the need of technical schools where such men can get necessary training. G. E. Jacquet of the Society for Electrical Development outlined the coming campaign for better home lighting.

Entertainment features included golf matches in the afternoons and a banquet on Wednesday evening.

Drought Does Not Lessen Enthusiasm

Despite Power Shortage, California Electrical Association Holds Large Convention Full of Interest to Delegates and All Men of the Industry

WITH an unexpectedly large attendance the eighth annual convention of the Pacific Coast Electrical Association opened at the Hotel Coronado, Coronado Beach, Cal., June 17, for a four-day meeting. By Wednesday night the registration had exceeded four hundred, which was very gratifying in view of the power-shortage situation facing the utilities and the slack business conditions brought about by the lack of rain.

The work of the various sections was summed up by the respective chairmen following the president's address on Tuesday morning. These reports showed an active year with many definite accomplishments. The hydraulic power committee did a very constructive piece of work in its report on control and outlet works for dams and diversion works. This report comprises a large part of the report of the national committee for this year. One of the most active divisions of the Commercial Section was the Electric Truck Bureau, which was organized near the close of the last association year. This bureau held a truck school in San Francisco last fall, and as a result of this and the activities of the central-station companies more than 180 electric street trucks have been sold. Several of the power companies are now large users of electric trucks in their own business and are rapidly coming to recognize the value of the industrial and street truck as a central-station load builder.

A women's meeting under the auspices of the Public Relations Section, held Wednesday morning, was an innovation which met with great success. Fifty women were in attendance and listened to talks on the part that the wives of electrical men can play in promoting the electrical idea in the home and in creating better public relations with the power companies.

TECHNICAL PAPERS

A valuable paper was presented at the first technical session which showed the possibilities of increasing the rating of self-cooled transformers by circulating the oil through automobile radiators and cooling these radiators with forced draft.

At the meeting of the committee on prime movers an interesting paper was presented by E. H. Peabody of New York in which he described a new type of mechanical oil burner. The author questioned the advisability of using such large furnace volumes as are now considered good practice.

A paper by J. P. Jollyman, Pacific Gas & Electric Company, showed that during the six months of operation of the Pit River transmission line of that company there have been only a few minor cases of trouble and that all 220-kv. equipment has functioned satisfactorily.

According to H. A. Barre, Southern California Edison Company, who discussed this paper, his company is experiencing no particular trouble on its 270-mile Big Creek transmission lines, which have been in operation at 220 kv. for more than a year. In designing a third Big Creek line to operate at this voltage, Mr. Barre said, the company is adopting a larger conductor with less tension and is making some mechanical changes in the dead ends.

NEW OFFICERS

A change in the procedure of electing officers was made at this meeting, the election being held on the morning of the first day, instead of at the close of the convention as in the past, in order to afford an opportunity for the new officers to meet with the outgoing ones before the convention closes. L. M. Klauber, San Diego Consolidated Gas & Electric Company, was succeeded as president of the association by F. A. Leach, Jr., Pacific Gas & Electric Company. William Baurhyte, Los Angeles Gas & Electric Company, was elected first vice-president, and S. Waldo Coleman, Coast Counties Gas & Electric Company, second vice-president. James F. Pollard, Coast Valleys Gas & Electric Company, will serve as treasurer, and Samuel H. Taylor was re-elected secretary.

Boston Rate Case Settlement Hits Snag

A resumption of proceedings in the Boston Edison rate case before the Massachusetts Department of Public Utilities is in prospect in view of the failure of the New England Newspaper Publishing Company and the city authorities to agree with the company to terminate proceedings on the basis of the proposed rate reductions outlined in the ELECTRICAL WORLD for May 24, page 1100. These reductions included a proposed decrease in the residential service rate in the company's schedule "A" from 9.5 cents per kilowatt-hour to 9 cents on July 1, 1924, with further reductions to 8.5 cents December 1, and to 8 cents December 1, 1925. The reductions contemplated would have saved the consumers in the Boston territory more than one million dollars a year. In recent conferences the petitioners demanded that the company extend the reductions to include numerous small stores and offices also served under the "A" rate, but President Edgar could not see his way clear to make these further sweeping cuts in view of the liberality of the reductions already accepted in the residential schedules.

Since this case was begun eight years ago before the former Massachusetts Gas and Electric Light Commission nearly seventy hearings have been held and more than 4,500 pages of testimony taken. The city of Boston has expended about $130,000 in the case in expert and legal costs. Popular interest in the proceedings has sunk to a low ebb.

Montreal Merger Under Way

Quebec-New England Company Will Be Taken Over by Montreal Light, Heat & Power

FOR the last week or two rumors have been prevalent in financial circles and have found their way into the daily press regarding a coming merger of Canadian utility companies with headquarters at Montreal into a twenty-million-dollar holding corporation. The companies which, it was said, were to be included were the Montreal Light, Heat & Power Company, the Quebec-New England Hydro-Electric Corporation (formerly the Montreal Public Service Corporation), the Canadian Light & Power Company and the Montreal Tramways & Power Company. The first-mentioned company, it was understood, would exercise the controlling interest in the merger, which the Shawinigan Water & Power Company, of which J. E. Aldred of New York is president, would be largely instrumental in bringing about. The Quebec-New England Hydro-Electric Corporation and the Canadian Light & Power Company have been controlled by the Montreal Tramways & Power Company, which also owns a majority of the stock of the Montreal Tramways Company. E. A. Robert was until recently president of all four of the last-named companies, but control has passed from him to a group headed by A. E. Beauvais.

Confirmation of the reported merger has now been officially forthcoming to the extent of an announcement that the Quebec-New England Hydro-Electric Corporation has agreed to go into the new holding company. Its shares will be turned in, and the next step will be an offer to the shareholders of the Montreal Tramways & Power Company for their stock. It is understood that some big shareholders have already accepted.

CARILLON POWER SCHEME

What effect the consolidation just alluded to will have on the project attributed to Mr. Robert of generating hydro-electric power at Carillon, on the Ottawa River, for exportation to the United States is a question raised by the Montreal correspondent of the *Financial Post* of Toronto, who continues:

"Robert and his group have been fighting hard at Ottawa to get the necessary permission to export power. The Shawinigan people have not committed themselves publicly to their views on the export of power, but are known to have opposed power export strenuously in the past, while various members of the directorates of both Shawinigan and Montreal Power have expressed their views publicly against the granting of permission for the export of power."

Bangor Utilities to Merge

Electric, gas and railway utilities serving eastern Maine with headquarters at Bangor have organized the Bangor Hydro-Electric Company with a capitalization of $10,000,000 to acquire the properties and franchises of the Bangor Railway & Electric Company, Bar Harbor & Union River Power Company, Bangor Power Company, Lincoln Light & Power Company and other property to be acquired by the last-named from the Montague-Howland Electric Company, Penobscot Light & Power Company and Edward M. Graham. Hancock, Penobscot and Washington Counties are served by the proposed company. The papers of incorporation have been approved by the Attorney-General of Maine. The capitalization is equally divided between common and preferred stock.

Marked economies in financing and administration are anticipated from the merger. There are about 77,000 people in the territory covered, and the total generating capacity now in service or shortly to be in use is 22,439 hp. The company will have about 16,000 customers, and the present system output, requiring no steam station service from one end of the year to the other, is about 63,000,000 kw.-hr. The officers of the new company are: President, Edward M. Freese; treasurer, Howard Corning; directors, E. M. Graham, A. E. Bass, C. D. Stanford, J. N. Towle, H. Corning and F. Silliman, 3d, all of Bangor.

Round-Table Discussions at Winona, Minn.

They Prove Profitable Feature of North Central N. E. L. A. Convention—Red Wing Rural Line, Home-Lighting Campaign and Service Switch Standardization

ENTHUSIASTIC round-table discussions of many operating problems characterized the fifth annual convention of the North Central Geographic Division of the National Electric Light Association at Winona, Minn., June 11-13. Although this was the first time for several years that the convention had been held outside of the Twin Cities, a well-balanced program and entertainment features brought out a registration of 202. Plans for obtaining a permanent secretary were turned over to the executive committee for action.

E. H. Finkelberg, Wisconsin Railway, Light & Power Company, Winona, opened the round-table discussion Thursday morning by telling about his company's method for dealing with customers who steal electricity. Because of the difficulty in getting direct evidence a reward of $10 is offered to meter readers reporting such cases. Then the customer is told that a continuous-conduit service entrance must be installed, which will cost him $25. To prevent tapping the meter through the metal top the company now installs glass-covered meters. C. G. Hadley, Rochester, said that his method of handling such customers is to send a high bill and present the evidence of theft when the customer complains. G. O. House, St. Paul, thought a word of reprimand sufficient penalty for customers who do not really understand just what experimenting relatives are doing. The discussion favored free discussion with offending customers to show them that they are really hurting themselves, especially if they are stockholders.

MULTIPLE STREET LIGHTING FAVORED

The street-lighting discussion brought out the lack of uniform lamp spacing, intensities and mounting heights for similar conditions of Illumination. J. E. Cameron, Minneapolis, spoke on the control features of the multiple system and said he preferred a lead-covered cable rather than a steel-covered one because a workman's pick penetrating the former type would directly operate the protecting relay and repairs could be made before covering the cable. He pointed out that although a multiple system cost 35 per cent less than a series system, the question of mounting heights was too often determined by the money a community could afford to spend rather than by the consideration of efficiency. No system, he held, should be built lower than 12½ ft. D. F. Parrott, Minneapolis General Electric Company, explained the motor-controlled relay system in Minneapolis, where the pilot wire is energized at 5 watts during the day so that any accident to it automatically lights the lamps. The excellent field for central-station companies in the illumination of highways was brought out by Paul Reed, Minneapolis. Leonard Nelson and A. G. Dewars showed that from the point of view of power factor and space economy the multiple system had advantages over the series type because it operated at power factors between 90 and 100 and involved a space saving of 4 to 5 per cent in substations.

PROTECTION FROM LIGHTNING

F. S. Rice, Minnesota Power & Light Company, Duluth, Minn., considered the problems of proper lightning-arrester protection. These must be decided by balancing the cost of the arresters against the total cost of the substation equipment. By proper selection and application of arresters Mr. Rice had been able to lower his transformer burn-outs from 2 per cent to six-tenths of 1 per cent. Instead of a static ground line each pole is grounded by a wire wrapped zigzag down the pole. The use of horn-gap arresters was not favored by the speakers.

Public relations were discussed by L. O. Gordon, Southern Minnesota Gas & Electric Company, Albert Lea. He said that good service and customer ownership go hand in hand as antidotes to socialistic theories. The utility's office should be, he thought, the social center of the community, and he explained the work his organization has done along these lines (see ELECTRICAL WORLD, September 1, 1923, page 445). With a nominal charge of $2 to $7 a night for the use of the company's hall in Albert Lea, rarely a night passes that some social gathering is not held there. G. O. House, St. Paul, stressed the fact that sound confidence in the utility must be built up by the public, the customers and employees.

The Friday morning session was devoted to rural service problems, special emphasis being laid on the development work in starting the Red Wing and the South Dakota experimental rural lines. Dr. E. A. White, director of the Committee on the Relation of Electricity to Agriculture, declared that before attempting to solve any rural problems utilities must first acquire the correct mental attitude. They must learn how to protect their own investment by first determining how the farmer can best utilize electricity. After that it becomes merely a matter of good business sense. Nine state committees are now co-operating with the national committee.

Prof. E. A. Stewart, University of Minnesota, went into the details of the Red Wing project, which, he said, is going to the bottom of the rural problem in determining the exact limits of the use of electricity on the farm. Electrical equipment is lent by the manufacturers on a three-year basis, after which the farmers have the option of purchasing it if they desire. Every electrical operation is metered, and records are kept. The equipment includes complete home lighting, washing machines, vacuum cleaners and motors for such uses as separators, feed grinders, ranges, electrical refrigerators and incubators. Professor Stewart told of an experiment to establish the comparative merits of an electrical incubator and one heated by oil. The oil-heated incubator yielded 55 per cent of the hatch and the electrical incubator produced 77 per cent.

While the Red Wing project is going into all phases of the application of electricity to agriculture, the South Dakota project is limiting itself to those experimental devices which will show an economical use, according to Dr. Harold M. Crothers, South Dakota College of Agriculture, Brooking, S. D., who followed Professor Stewart. By specializing on equipment purchased by the farmer himself this project will supplement the one at Red Wing and aid in determining the different conditions in various localities due to different methods of farming. On both these projects rates are based on a monthly demand service charge of $8 plus an energy rate of 5 cents a kilowatt-hour for the first 30 kw.-hr. of use, dropping to 3 cents for all in excess.

HOME-LIGHTING CAMPAIGN

J. E. Davidson, vice-president N. E. L. A., recounted the story of the "better home-lighting campaign," of which he is chairman, putting its total cost at $500,000. He strongly urged all utility men to back the movement.

Proper meter service entrances were considered by W. L. Wadsworth, meter superintendent Minneapolis General Electric Company. His practice is to inform contractor-dealers of the type number of approved switches so that all new installations are built with continuous conduit and inclosed switches, to which the utility company adds the proper meter end wall, thereby standardizing requirements from a safety standpoint. The discussion brought out the fact that where one branch circuit was identified for a ground it was only necessary to fuse the other side.

Officers elected for the ensuing year were: President, G. O. House, St. Paul; vice-president, C. S. Kennedy, Fergus Falls, Minn.; treasurer, A. L. Kipples, St. Paul. Members of the executive committee will be: H. F. Thomas, St. Paul; T. D. Crocker, Minneapolis; R. M. Howard, Winona, Minn.; W. H. Burtiss, Armour, S. D., and W. S. Heald, Duluth, Minn.

A. M. E. S. Hears Pleas for Industry Statistics

The need for industry statistics, greatly intensified because business is now operating on a falling market, was stressed by S. L. Nicholson, president of the Associated Manufacturers of Electrical Supplies, before the annual convention of that body this week at Atlantic City. "Times have changed," he said. "After twenty years of rising values we now have a period of falling values, and whereas it has been possible in the past for the manufacturers to stock raw material and for the jobbers and dealers to invest heavily in stock because their stock usually increases in value, now men cannot risk the probability of stocks decreasing in value. This condition will inevitably bring more demand for consignment stocks and for a far more rigid control of stock purchases all along the line." As a result, Mr. Nicholson said, the electrical industry has developed more facts on production, stock and sales. Such statistics will greatly relieve the present market from the burden of labor turnover. The Westinghouse company, for instance, pays $85 for every man "hired and fired." Its labor turnover is 200 per cent per annum. Mr. Nicholson reported the establishment of a committee of five men from the Electrical Manufacturers' Council and five from the Underwriters' Laboratories to co-operate in the development of approved standardization and to promote uniformity in electrical products.

R. A. Lundquist, chief of the electrical division of the Bureau of Foreign and Domestic Commerce, discussed the work that the government is doing to aid in the promotion of foreign business for electrical manufacturers.

William H. Thornley paid tribute to T. M. Debevoise, who has resigned as counselor for the A. M. E. S., and Francis E. Nagel was introduced as his successor.

J. C. McQuiston, in an address on "Waste in Literature," said that at the present time more than 50 per cent of the "dealer help" advertising material which is being furnished free to retailers by electrical manufacturers is wasted. Importance of action in the matter can be appreciated, he added, when it is known that $1,500,000 is being spent each year in this industry on this kind of sales help.

William L. Goodwin presented a plan for a "red-seal campaign" that has been developed by the Society for Electrical Development for the purpose of establishing a popular appreciation of quality and adequacy in the wiring of houses. Local leagues will be licensed to place a red seal of approval on houses wired after the standards and to give a certificate of quality to the owner.

Tomadelli Not Enjoined

New York Supreme Court Says State Has Failed to Prove "Bottled Sunshine" a Fraud

NEW YORK STATE lost its fight to enjoin the Tomadelli Electronic Corporation from further sale of its stock, through an opinion handed down last week by former Supreme Court Justice Joseph E. Newburger, who sat as referee in the trial of the Attorney-General's application for an injunction. He declared that the Attorney-General had failed to prove that the corporation had engaged in fraudulent practices in its sale of stock in a "bottled sunshine" lamp. The state will appeal the case.

The Tomadelli corporation was organized under the laws of Delaware three years ago, with a capital of $1,500,000, and erected a factory at Harrison, N. J., where Tomadelli started to work on his lamp, which he said could be made to burn for years at practically no expense by using the energy from the atmosphere. He had such a lamp burning in South America, he contended, but lightning destroyed it.

EXPERTS DERIDE CLAIMS

The state called as experts Dr. C. O. Mailloux and Dr. Clayton H. Sharp. Dr. Mailloux declared that the device alleged to produce electric light was an absurdity from the scientific point of view. In fact, said Dr. Mailloux, he made no extensive examination of the apparatus, abandoning it in disgust after discovering that the inventor had ignored at least one established law of physics. The contrivance might conceivably collect electric current, the witness said, but it could not possibly put it to the uses Tomadelli reported. Dr. Sharp also described Tomadelli's theories as impossible, testifying that there is no atomic disintegration of sea salt, tin or copper, although Tomadelli asserts that such is the source of energy in his lamps.

"The main evidence on which the plaintiff relies is the testimony of two experts," said Referee Newburger in his opinion, "who testified as to their experiences in matters of this kind and that in their opinion it is not possible to extract from the atmosphere energy as claimed by the defendant and that the generating apparatus violates well-known scientific principles and could not perform in the manner claimed by Tomadelli. . . . In this connection the experts admitted that they had not examined any part of the machinery used in the factory, but simply glanced at it, nor had they witnessed any test by Tomadelli, who under the advice of his patent lawyer declined to show the secrets connected with his proposed invention. . . .

"A great many inventions have been criticised and doubted before they were put into practical use. Nowhere is there any evidence of any fraud, and as the action is predicated upon that, I am of the opinion that the plaintiff has utterly failed to make out such a case as would warrant the court in granting injunctive relief."

The application for an injunction was made by the Attorney-General last February upon the complaint of the Better Business Bureau.

Lighting a Convention

Elaborate Plans for the Illumination of New York Streets During the Democratic Gathering

IF THE statements of the committee on illumination of the Democratic National Convention are to be believed, the special lighting of the streets, parks and buildings of New York City for the convention will surpass all work of this kind attempted before. Arthur Williams of the New York Edison Company is chariman of this committee and the other members are the heads of all the illuminating companies in the city. It is working in co-operation with the city's committee headed by Grover Whalen.

A "Golden Way" is being established on Fifth Avenue from Washington Square to Sixty-second Street, and both sides of the avenue over this length will be enlivened by streamers of smaller colored lights. At the foot of the "Golden Way" a battery of multi-colored searchlights mounted on the top of the Washington Arch will send a rainbow of light into the sky each night of the convention.

The 36-in. Sperry searchlight, which was built for the use of the United States Army in the World War and is said to be the largest in the world, will be set up in Madison Square Park and will probably be used to signal the nomination of the Democratic candidate for the Presidency.

Special lighting will also be installed under the the portico surrounding Madison Square Garden, where the convention is to be held. The "Golden Way" and the chain of colored lights will be diverted from Fifth Avenue to Twenty-sixth Street to Fourth Avenue to Twenty-seventh Street and back to Fifth Avenue, thus encircling the Garden. The special lighting will start on the night of June 24.

Death of H. M. Swetland

H. M. Swetland, president of the United Publishers' Corporation, which publishes *Iron Age*, *Dry Goods Economist*, *Automotive Industries* and other important business publications, died at his home in Upper Montclair, N. J., on June 15. He was one of the pioneers of modern industrial publishing and at one time was owner of *Power* and of the *Engineering and Mining Journal*, as it was then called, both now owned by the McGraw-Hill Company.

Mr. Swetland was born in Chautauqua County, New York, in 1853. In 1884 he became the Boston representative of *Power*, later coming to New York and assuming the management of that publication. In this capacity he was associated with James H. McGraw, now president of the McGraw-Hill Company, and Emerson P. Harris. The association was discontinued in 1888, when Mr. Swetland purchased *Power*, the ownership of which he retained until he sold it to the late John A. Hill in 1900. For many years thereafter Mr. Swetland gave his chief attention to the publication of the magazines serving the automotive industry. In 1911 he organized the United Publishers' Corporation, of which he was elected president. He was also president of the National Publishers' Association, the Class Journal Company and other enterprises. Mr. Swetland's work for and contribution to industrial publishing are well set forth in the following tribute paid to him by his lifelong friend and former associate, Mr. McGraw:

"Mr. Swetland's success as a man and a publisher was due to a rare combination of personal qualities and business acumen. He was a tireless worker, had great penetration, concentration and perseverance. He was an organizer of the first rank and was always a co-operator. His ideals in publishing were high, service to the readers of his publications being his first consideration. The publishing business has lost an outstanding figure in the passing of Horace M. Swetland, but his work will endure in the great institutions to which he gave unstinted devotion and in the lives of those whom he trained in the technique of publishing and encouraged to make the best of their opportunities."

Oswego Wins Suit for Right to Build Own Plant

The right of the city of Oswego, N. Y., to construct a hydro-electric power plant, to cost $345,000, by using surplus Barge Canal waters and state-owned land in exchange for a release of damage claims of $4,259,200 against the state has been upheld by the Court of Appeals of the state in a decision affirming the Appellate Division of the Supreme Court. The ruling sustained the report of the referee dismissing two actions instituted by the People's Gas & Electric Company of Oswego.

The company attacked the constitutionality of the legislative act of 1915 authorizing the city to use the surplus waters and the act of 1920 directing the State Superintendent of Public Works to give a deed of the state land in exchange for a release of the damage claims. The actions were for injunctions to restrain the city officials from issuing bonds authorized by the Common Council to pay the cost of construction and to prevent a release of the city claims against the state as illegal and a waste of public funds.

The city claims were for the appropriation of lands and damages caused by the construction by the state of the dam in the Oswego River as a part of the Barge Canal system, and these claims are now pending in the Court of Claims. The actions were tried in 1920, and the appeals from the decision of the referee dismissing the complaints have caused delay in undertaking the work. The contention of the People's Gas & Electric Company was that the state has no right to dispose of its impounded waters and that the exchange of a state deed for land for the release of claims against the state was a violation of the constitution.

A law passed at the last session of the New York State Legislature and described in the ELECTRICAL WORLD for May 10, page 977, exempted the Oswego project from the necessity of approval by the Public Service Commission. Apprehension has been expressed in some utility quarters lest this law be subject to an interpretation which will permit all cities in the state to develop or purchase and sell power in competition with existing utilities and regardless of the commission.

Lake and Air Pilots Guided by 300,000,000-Cp. Lamp

EVERY night this giant searchlight on the Union Trust roof, Cleveland, throws a 300,000,000-cp. beam into the clouds. The beam rotates slowly and on clear nights may be seen for 125 miles. The light will be of great use to night air pilots and vessels on Lake Erie. It was installed very recently during the opening of the Union Trust Banking new twenty-story building.

Before the Federal Power Commission

A Study of Proposed Diversion of Trinity River, California, Is to Be Made—The Fundy Tidal Project—Development of Mokelumne—Preliminary Permits

A THOROUGH investigation is to be made of the proposed diversion of the Trinity River into Sacramento Valley. This project is covered by an application made to the Federal Power Commission by W. H. Sampson of Corning, Cal. It is a combined irrigation and power project. The California board appointed by the commission to investigate the project reported in favor of the diversion. Further investigation on the part of the commission, however, indicates that power alone cannot bear the cost of the project. There is doubt as to the ability of the lands which will be improved to bear enough of the cost to make the development profitable to all concerned. Before taking final action, the commission has sent Major H. S. Bennion, its assistant chief engineer, to California to look over the project and has requested the Secretary of Agriculture to report as to the price the farm land would be justified in paying for the water.

The commission has been advised from the Pacific Coast that the East Bay cities—which recently retained A. P. Davis to study their water-supply problem—are considering going to the Trinity for their water supply. The commission is anxious to establish whether or not this project is in a position to compete with the city of San Francisco, which would like to furnish water to its neighbors from its Hetch Hetchy project, and with the Snow Mountain Water & Power Company, which is in a position to furnish the necessary water from Eel River.

Tidal Power on Bay of Fundy

The commission has asked the State Department to suggest to the Canadian government that it join with the United States in referring to the International Joint Commission for investigation, report and recommendation the application of Dexter P. Cooper of Buffalo for a preliminary permit covering a tidal-power project in the Bay of Fundy. Mr. Cooper proposes to erect a series of dams connecting the islands which separate Passamaquoddy Bay and Head Harbor from the Bay of Fundy, thereby creating two pools, between which he desires to erect a power house of large capacity to develop continuous power from the pool which will be filled by the tide and by water from the St. Croix River.

The engineers of the commission have some question as to the feasibility of the project, but its magnitude and the public interest which is attached to the possibilities of developing power by the use of tides seem to justify the investigation. If constructed, the project will be partly in the Dominion of Canada.

Development of Mokelumne

The commission has declined to extend the preliminary permit which was issued more than a year ago to the Mokelumne River Water & Power Company of San Francisco. The action is significant in that it indicates the determination of the commission to keep live projects only on its records. The preliminary permit was issued for one year. In this case no effort was made to carry forward the work for which it was issued. The company even waited until the permit had expired before applying for its extension.

Stephenson E. Kiefer, who, as reported in the ELECTRICAL WORLD for May 17, page 1020, has applied to the Federal Power Commission for a preliminary permit to construct a dam across the Mokelumne River, about 20 mlies above Lodi, Cal., stating it to be his intention to develop 20,000 hp. at the site, now has a clear field, the Construction Company of North America, which had applied for this permit prior to Mr. Kiefer's application, having withdrawn its application in favor of Mr. Kiefer.

Alaska Projects Before Commission

The Federal Power Commission has been requested to extend for one year the preliminary permit granted two years ago to Frank L. Ballaine. The permit covers a project on Kenai River near Seward, Alaska. It is the intention of the applicant to use the power in connection with the manufacture of wood pulp. The additional time is needed, it is explained, to complete arrangements for financing the proposition.

John Hovland of Hyder, Alaska, has applied to the commission for a preliminary permit covering a project on Fish Creek. An active mining district recently has developed in the vicinity of Hyder, and the power is intended for use in connection with mining operations. This is the third power project to come before the commission from the Hyder area. In the two other cases preliminary permits already have been issued.

Preliminary Permits

Preliminary permits have been authorized by the commission in favor of the Central Missouri Power & Water Company, of Kansas City, covering two projects on Gasconade River, which will have a combined capacity of 56,000 hp.; the American Alum Corporation of New York, covering a development on a section of the Gila River in western New Mexico; John A. Shafer of Indianapolis, covering a power project in the Wabash River, 6 miles below Logansport, Ind.; the Kentucky Northern Power Company of Frankfort, for a project in the Licking River near Falmouth, Ky., where it is estimated that 36,000 hp. can be developed by the erection of a dam 94 ft. high, and the Columbus (Ga.) Electric & Power Company, covering its project at Bartlett's Ferry, on the Chattahoochee River, where a 120-ft. dam will be erected and a total of 80,000 hp. may be developed. The preliminary permit issued on March 29, 1923, to Frank G. Baum of San Francisco, covering a project on the Little Colorado River in Arizona, has been canceled because of failure to do the required stream gaging and foundation exploration.

Briefer News

Providence Engineers Elect.—With a total announced membership June 1 of 1,304, the Providence (R. I.) Engineering Society elected the following officers for the ensuing year: President, Frederick W. Bliss; vice-president, Ralph C. Patton; treasurer, Albert E. Thornley; councilors, S. T. Arnold, H. W. Congdon, S. D. Fitzsimmons and C. D. McEvoy.

Another Michigan Municipal Plant Gives Up.—By a vote of more than five to one, citizens of the village of Ovid, Mich., have granted the Consumers' Power Company a thirty-year franchise for light and power service. An audit of the books of the municipal plant revealed that it had been operating at a loss of from $4,000 to $8,000 a year, in spite of a rate higher than that asked by the company.

Emanuel Southwest Properties Are Merged.—The Choctaw Power & Light Company of McAlester, Okla., and the Coal District Power Company of Huntington, Ark., have been merged as the Southwest Power Company, with headquarters at McAlester, and their plants will be connected by a 66,000-volt line. Both companies are owned by the Albert Emanuel Company of New York City.

First Unit at Hale's Bar Ready.—The first unit of the new steam station of the Tennessee Electric Power Company at Hale's Bar will be placed in operation on June 25, according to official announcement by B. C. Edgar, vice-president and general manager. This unit will give the company an additional 28,000 hp. Work has been started on the second unit, a duplicate of the first, and this will be ready for operation in the fall.

Lower St. Lawrence Power Company Growing.—The Lower St. Lawrence Power Company of Rimouski, Quebec, which began operations two or three years ago in the province with a 500-hp. hydro-electric plant, has grown to the point where it will soon be in a position to supply a large part of the Matapedia valley with energy and is erecting a 60,000-volt transmission line across the provincial boundary line to Campbellton, New Brunswick.

City of Chihuahua Gets Hydro-Electric Power.—The Compañia Agricola y Fuerza Electrica has just finished the construction of its power transmission line from the large hydro-electric plant at Boquilla to the city of Chihuahua, Mexico, at a cost of a million dollars, including the installation of substations. The company is now delivering power

to many manufacturing plants, mines and other industries in the territory traversed by the power line and in Chihuahua. The municipal authorities in the latter city are preparing to install a modern street-lighting system.

Ogdensburg (N. Y.) Plant Transferred. — The transfer of the hydro-electric generating plant of the St. Lawrence County Utilities, Inc., in the city of Ogdensburg, N. Y., together with water rights, to the St. Lawrence Transmission Company, now the St. Lawrence Valley Corporation, has been approved by the New York Public Service Commission. The consideration in the transaction was $179,694. The transfer becomes effective July 1.

Pennsylvania Electrification Prophecy. — Disposal by the Susquehanna Power Company to Philadelphia bankers of an option on its projected Conowingo hydro-electric development in Maryland is interpreted in the Baltimore and Washington press as forecasting the electrification of the Pennsylvania Railroad between Philadelphia and Washington. No intimation that such an undertaking is contemplated in the immediate future is, however, as yet forthcoming.

Union Gas & Electric Offers Half Million for Hamilton Plant.—The Union Gas & Electric Company of Cincinnati has plans under way to buy the municipal electric light and power properties at Hamilton, Ohio. Improvements, including additions and extensions, will be made following the city's acceptance of the company's offer, which says that the company will assume the plant and equipment for approximately $500,000. The Union Gas & Electric Company acquired the Hamilton Utilities Company nearly a year ago.

Villisca, Iowa, Enjoined from Establishing Municipal Plant. — The Iowa Service Company has obtained from the United States District Court an injunction against the city of Villisca to prevent it from installing a municipal electric light and power plant and distributing system and to require that the electric bonds issued by the city be used for the purpose of acquiring the electric distributing system of the company, as provided by an Iowa statute. The city had ordered the company to remove its poles and wires from the streets.

First Section of Alaskan Cable Successfully Laid.—The first section of the Washington-Alaska cable system from Seattle to Ketchikan, Alaska, has been installed. The distance is 865.65 nautical miles. This new cable is insulated with gutta percha and represents the latest developments in the cable art. Tests have proved it to be capable of carrying as many words as present sending apparatus can dispatch and give assurance of its ability to handle without congestion for many years both the commercial traffic between Alaska and Seattle and the press service to newspapers in that territory. The new cable was designed by the Signal Corps of the army and was transported from England and laid by the army cable ship *Dellwood*.

Frederick (Okla.) Council Says Power Contract Will Save City Money.—Announcement is made by the Southwestern Light & Power Company that construction of the extension from its Lawton and Quanah high-voltage line to supply light and power to the city of Frederick, Okla., will be completed and service established in about two months. This will be a 13,000-volt line. The 66,000-volt line between Lawton and Quanah is now completed. A statement signed by all members of the Frederick City Council says that the closing of the municipal plant and execution of the contract with the company will save citizens fully $14,000 annually. The contract assures the city adequate power, a favorable cooking rate and an electric sign rate, none of which could be obtained under municipal ownership.

Pennsylvania State Association of Electrical Contractors and Dealers.—This association held its twelfth general meeting at Allentown, Pa., on June 11, with a good attendance from over the state. R. S. Bergin of the Radio Corporation of America traced the historical development of radio. Samuel Adams Chase talked on "Selling the Electrical Idea to the Public." G. E. Jacquet of the Society for Electrical Development spoke on the national home-lighting contest. Good progress for the year, including incorporation under state laws, was reported. J. Lloyd Smith was elected president, succeeding R. W. Keck, and M. G. Sellers was re-elected secretary. An auto tour through Col. H. C. Trexler's 3,000-acre game reservation was an unusual entertainment feature. J. Hall Truman, Jr., division manager Pennsylvania Light & Power Company, was toastmaster at the annual banquet, held at the Hotel Allen.

Coming Meetings of Electrical and Allied Societies

[A complete directory of electrical associations is published in the first issue of each volume. See January 5 issue, page 72, for latest list.]

Wyoming Utilities Association—Casper, Wyo., June 23-24. H. C. Chappell, Natrona Power Company, Casper.

American Institute of Electrical Engineers — Annual convention, Edgewater Beach (Chicago), June 23-27. F. L. Hutchinson, 33 West 39th St., New York.

American Society for Testing Materials—Chalfonte-Haddon Hall Hotel, Atlantic City, N. J., June 23-27.

Iowa Section, N. E. L. A.—Wahkonsa Hotel, Fort Dodge, June 24-26. M. G. Linn, Des Moines Electric Co., Des Moines.

National Council Lighting Fixture Manufacturers—Atlantic City, N. J., June 25-27.

Society for the Promotion of Engineering Education—University of Colorado, Boulder, Col., June 25-26. F. L. Bishop, University of Pittsburgh, Pittsburgh.

Northwest Electric Light and Power Association—Gearhart Hotel, Gearhart, Ore., June 25-27. G. H. Gueffroy, Pacific Power & Light Company, Portland.

American Physical Society—Stanford University, Cal., June 26.

Association of Municipal Electrical Utilities of Ontario—Niagara Falls, Ont., June 26-28.

Ohio Electric Light Association—Hotel Breakers, Cedar Point, Ohio, July 8-11. D. L. Gaskill, Greenville, Ohio.

East Central Division, N. E. L. A.—Cedar Point, Ohio, July 9. L. B. Herrington, Kentucky Utilities Co., Louisville.

Mississippi Electrical League—Gulfport, Miss., July 14-15.

Pacific Coast Electrical Supply Jobbers' Association—Del Monte, Cal., July 24-26.

A. A. E. Secretary on Engineering Employment.—A statement issued by E. B. Miller, employment secretary of the American Association of Engineers, says that graduates in civil engineering are most in demand as the schools close because of the unprecedented highway building program throughout the country and other projects under way. "Electrical engineers are probably second in demand at this time," Mr. Miller says. "A great number of them go into the service of public utilities, usually big corporations. These have attained a stability that makes them less sensitive to the ups and downs of business than concerns that employ civil engineers. Their initial starting rate is usually low and advancement is slow, but employment is fairly permanent and the big positions are the goal." Graduates in mechanical engineering will feel the business slump the most, the secretary thinks.

St. Lawrence Commission Makes Tour. —Members of the United States St. Lawrence Commission, of which Secretary Hoover is chairman, accompanied by the American members of the joint engineering commission, began an inspection tour of the St. Lawrence River on June 13 which lasted until June 18. This was the first official step of the commission, recently appointed by President Coolidge, to co-operate with a similar Canadian commission in plans for navigation and power development of the St. Lawrence waterway. The inspection tour was arranged to afford the members an opportunity of getting a visual impression of the river and the works already established. The schedule included a visit to Niagara Falls in which plans for preserving the beauty of the cataract were more or less closely involved, a trip along the Welland Canal and a water trip to Toronto, a river trip from Kingston to Prescott with an inspection of the dams, forebays and power house at Sheik Island, a trip to Ogdensburg, and a tour of the river from Cornwall to Montreal and from Montreal to Quebec.

Colorado Springs and Loveland, Col., Continue Plans for Municipal Plants.—The city of Colorado Springs, Col., where a popular vote recently authorized a bond issue for the purchase or erection of an electric plant, is having a survey made of a hydro-electric site at Ruxton Park, on the slope of Pike's Peak, with a view to erecting the proposed plant there at a cost of about $46,000, the authorities having so far come to no agreement with the Colorado Springs Light, Heat & Power Company for the purchase of its property and asserting that the company's steam plant is obsolete. At Loveland, Col., where also a municipal plant has been determined upon, a contract has been let, despite the veto of the Public Utilities Commission of the state, the municipal authorities relying upon a decision of the Colorado Supreme Court

to sustain their defiance of the regulatory body. It is by no means certain, however, that a bond issue still to come before the voters of Loveland to provide funds for this plant will be carried.

Electricity Supplies "Eternal Light."—An electric star crowning a tall staff in Madison Square, New York City, has been presented to the city as a tribute to New York men who gave their lives in the World War. It is to be called the "eternal light," because it is the intention to keep it burning for years, perhaps generations, to come. The light is framed in a gold star five feet in diameter. It is mounted on a pole 120 ft. high, embedded in a granite base inscribed with the names of the World War battles participated in by New York troops. The pole has been fashioned from an Oregon pine.

Storm in Southern Indiana Damages Electric Utilities.—Recent high winds and floods caused much damage to electric light and power utilities as well as interurban railways in Indiana. A veritable tornado swept across the southern part of the state, being especially vicious at Shelbyville and Rushville, where wires were torn down, poles uprooted and power and light cut off. Both these places were without any electric service for several hours. Directly south of Indianapolis much damage was done to the properties of the Interstate Public Service Company by the flooded conditions which followed the storm.

Cleveland-Toledo Power Line.—The new fifteen-hundred-thousand-dollar 66,000-volt line of the Ohio Public Service Company, connecting Lorain and Mansfield, was placed in operation for the first time on June 9, together with the two-hundred-thousand-dollar substation built to feed it. The line connects Lorain with Mansfield, Alliance and Ashland and is tied in with the lines of the Ohio Power Company, serving Fremont, Fostoria and Tiffin. When entirely completed it will link Toledo and Cleveland, forming a part of the "superpower zone" of the Ohio-Pennsylvania region. The new line is 60 miles in length and is supported by 483 towers.

General Tripp Attacks Maine's Water-Power Law.—"If Maine repeals her water-power law and permits her water power to be absorbed by a superpower system, when the opportunity presents itself, she will turn a waste into an asset, reduce the amount of coal consumed elsewhere in the United States and assure for herself electric service of the highest quality at the lowest cost and in any desired amount," said General Guy E. Tripp, chairman of the Westinghouse Electric & Manufacturing Company, who is a native of Maine, at a luncheon at Lewiston, Me., the other day. "It so happens," he concluded, "that because of her geographical position Maine can isolate herself electrically from the rest of the nation without causing great injury to the people of other states. She will, however, injure her own people by doing this, just as she would if she were to isolate her railroads."

Readjustment of Electric Properties in Arkansas.—The Arkansas Light & Power Company of Pine Bluff, Ark., has acquired from the Arkansas Utilities Company the electric distribution systems and other properties of the Arkansas Utility Company at Brinkley, Cotton Plant, Clarendon, Fordyce, Rison and Kingsland and has sold to the Arkansas Utilities Company the properties at Paragould, comprising power station, ice factory and distribution system. It has been supplying energy for Brinkley, Cotton Plant and Clarendon, wholesaling it to the Arkansas Utilities Company. Fordyce, Rison and Kingsland have been supplied from a small power station at Fordyce.

Fight Over Transmission Lines from Wabash Plant Reaches New Stage.—The Superior Court in Indianapolis has issued an order granting the Indiana Electric Corporation's request for condemnation of a right-of-way for an extension of its high-tension power line from Indianapolis to its new plant on the banks of the Wabash River near Terre Haute over the tracks of the Terre Haute, Indianapolis & Eastern Traction Company, near Maywood, Ind. The traction company will appeal the case. The Indiana Electric Corporation, as already recorded, filed suit some time ago against the traction company asking that the right-of-way be condemned and that it be permitted to cross the traction line with its high-tension wires. The traction company refused to grant the crossing and resisted the suit. The Indiana Public Service Commission had previously granted the electric corporation permission to cross the traction line. In the court ruling just made it was stipulated that the crossing should be at right angles and that the wires should be at least 20 ft. above the wires of the traction company.

French-Italian Electric Imbroglio.—Two Riviera electric companies, one on the French coast and the other on the Italian side, have recently gone into the courts to settle damages claimed by the French Energie Electrique du Littoral Méditerranéen, the opposing organization being La Società Elettrica della Riviera di Ponente, known more familiarly as the Società Negri, administered by the Italian engineer Negri. The question arose from the excessive use by the Italian company of the water of the frontier River Roya, whose course chiefly runs on Italian soil. The case was decided in favor of the French company, to which were awarded damages of 196,511 francs for the years 1919 and 1920. In addition the French company received the sum of 1,642,901 francs and 2,340,000 francs for the construction of two reservoirs on French soil, these being made necessary in order that the plant might be able to furnish at all times sufficient hydro-electric power to meet its obligations to subscribers. The Italian company was also condemned to pay the expenses of the French company in carrying the matter to the courts.

Men of the Industry

Changes in Personnel
Accomplishments, Responsibilities, Honors, Appointments and Activities of Men Engaged in all Branches of the Electrical Industry

R. J. Beaumont Elected President of Canadian Association

R. J. Beaumont, who was elected president of the Canadian Electrical Association at the recent convention held in Ottawa as was announced in the June 14 issue of the ELECTRICAL WORLD, is general manager of the Electric Service Corporation, Shawinigan Falls, Quebec. Mr. Beaumont received his general and technical education in London, England, his native city. He served the London Underground Railways as draftsman and engineer on design, construction and operation of steam plants and substations. After his arrival in Canada he affiliated himself with the Shawinigan Water & Power Company in Montreal as draftsman in 1910, one year later being appointed chief draftsman. He was promoted to the position of purchasing agent of that company and of all electrical and manufacturing subsidiaries in 1913. Since that time he has held various positions with the Shawinigan company or its subsidiaries, and he is at present general manager of several companies as well as general manager of the Electric Service Corporation. Mr. Beaumont has been prominently connected with the activities of the Canadian Electrical Association, having served as vice-president during 1923, chairman of the Technical Section for three years and as chairman of various sub-committees of the association at different times.

Owen D. Young, chairman of the board of directors of the General Electric Company, received the honorary degree of doctor of laws at the commencement exercises of Tufts College, Medford, Mass., held this week.

Gerard Swope, president of the General Electric Company, was awarded the honorary degree of doctor of science by Union University, Schenectady, N. Y., on Tuesday, June 10. This same degree was conferred on Mr. Swope a year ago by Rutgers College.

Alfred D. Flinn, director of the Engineering Foundation, has been made an honorary foreign member of the Masarykova Akademie Prace of Prague. The election was approved by decree of the government of the Republic of Czechoslovakia given through its Minister of Foreign Affairs.

Harold V. Bozell, editor of the ELECTRICAL WORLD, sailed for Europe on Thursday, June 19, aboard the Cunard liner *Scythia*, to attend the World Power Conference to be held in London from June 30 to July 12. While

abroad he will travel extensively on the Continent, including in his itinerary France, Poland, Czechoslovakia, Germany, Italy, Switzerland and Spain and during his visit to Czechoslovakia will be present at the convention of the Czechoslovakia Electrical Association and the International Management Congress, which meet in Prague in July. Mr. Bozell is planning to return to the States late in August.

Frank M. Lillie, for the past two years advertising manager of the Union Gas & Electric Company, Cincinnati, has been appointed advertising director of the Columbia Gas & Electric Company, New York and Cincinnati, which controls the Union Gas & Electric Company. Mr. Lillie will make his headquarters in Cincinnati.

Lawrence W. Wallace, secretary of the American Engineering Council, has been elected to membership in the Masaryk Academy, Prague, according to an announcement made by the Ministry of Foreign Affairs of Czechoslovakia. Mr. Wallace was vice-chairman of the Hoover Committee on Elimination of Waste in Industry, whose findings have been officially adopted by the government of Czechoslovakia for the guidance of industry.

Gen. George H. Harries, vice-president of H. M. Byllesby & Company, has taken charge temporarily of the San Diego (Cal.) Consolidated Gas & Electric Company to fill the vacancy caused by the resignation of H. H. Jones. Mr. Jones was recently elected vice-president in charge of operation of the Northern States Power Company. Both the San Diego company and the Northern States company are under Byllesby management.

Arthur B. Lisle, general manager of the Narragansett Electric Lighting Company, Providence, R. I., has been appointed chairman of the Public Relations Section of the New England Geographic Division of the National Electric Light Association. Mr. Lisle was president of the New England Division in 1918 and has long been in sympathy with public relations activities. Under his management and with the co-operation of his associates the Providence company has lately made striking progress in the development of the customer-ownership plan.

Charles Herbert Baker has recently become associated with the Sessions Engineering Company, consulting engineers of Chicago, as chief mechanical engineer. Mr. Baker is a graduate of Harvard University, class of 1902, and since that time his connections have included the position of engineer with Westinghouse, Church, Kerr & Company, power station inspecting engineer with the Brooklyn Rapid Transit Company, mechanical engineer with the Public Service Electric Company of New Jersey and consulting engineer with the Diamond Alkali Company.

H. H. Cudmore, formerly director of the "Mazda" bureau of the General Electric Company and for two years vice-president of the Metropolitan Bond Company, Chicago, in charge of public utility financing, has opened offices in Cleveland with the purpose of supplying a personal service to public utilities interested in selling securities under the customer-ownership plan. Mr. Cudmore's services will be available to public utility companies as consultant on preliminary organization work for customer-ownership campaigns and in the actual supervision of selling the securities. His long experience with the electrical business plus the knowledge he has gained in handling public utility financing fully equips him to render this service to the industry.

W. M. Martin, formerly connected with the Allegheny Valley Light Company at New Kensington, Pa., has been transferred to Grafton, W. Va., as division manager of the West Virginia & Maryland Power Company.

J. Irwin Moore has resigned from the Philadelphia Electric Company to join the Electric Storage Battery Company as an erecting engineer.

J. B. Silverman, who was associated with the Union Gas & Electric Company, Cincinnati, has recently affiliated himself with the Ohio Edison Company, Springfield.

Pliny P. Pipes, formerly welding engineer with the Lincoln Electric Company, is now associated with the Ohio Brass Company, Mansfield, Ohio, as development engineer.

Otis Gerke has been elected assistant treasurer of the Wisconsin River Power Company and the Southern Wisconsin Power Company, both at Madison.

S. E. Gates, who has been in charge of the Spokane office for fourteen years, has been appointed manager of the Los Angeles office of the General Electric Company.

Donald F. Burns has been appointed district manager of the Northern States Power Company at Alma, Wis., succeeding Frank Koskuba, who has been transferred to Chippewa Falls.

D. C. Durland of the General Electric Company, which has secured control of the Canadian General Electric Company, has been made a director of the Canadian company, associating himself with the management in Toronto.

Frank Koskuba, who has been district manager of the Northern States Power Company's electric properties at Alma, Wis., for nearly a year, has been transferred to the company's properties at Chippewa Falls.

H. L. Scovell, formerly connected with the southern division of the Alabama Power Company as superintendent of local operations, has recently become division superintendent of the California Oregon Power Company at Medford, Ore.

Charles H. Carpenter has joined the sales organization of the Automatic Refrigerating Company, Hartford, Conn., with general supervision of the western Massachusetts and New Haven districts. Mr. Carpenter was formerly associated with his father, the late Eugene Carpenter, in the operation of the central-station properties on Cape Cod and Martha's Vineyard, Mass.

C. Blue of Regina, Saskatchewan, Canada, formerly connected with the Pacific Gas & Electric Company, has recently joined the Oklahoma High Line Construction Company, Tulsa, Okla., where he has been appointed chief engineer and superintendent of construction. Mr. Blue has been in close contact with public utilities for the past fifteen years.

K. A. Hills, who has been attached to the Davenport sales office of the General Electric Company since January, was recently made manager of that office, covering a territory including a large part of Iowa. Mr. Hills has been an employee of the General Electric Company since May, 1910.

C. A. Kittredge, superintendent of the southern division of the Alabama Power Company, has assumed the duties of superintendent of local operations owing to the resignation of H. L. Scovell. Mr. Kittredge will continue as division superintendent, being assisted by R. A. Porter.

Howard E. Murphy, formerly connected with the construction department of Stone & Webster, Inc., Boston, and more recently with the Luminous Unit Company of St. Louis, as illuminating engineer, and later as district manager of its Boston and Chicago offices, has rejoined the Stone & Webster organization as engineer in its electrical division.

Alex Dow, president of the Detroit Edison Company, was awarded the honorary degree of doctor of engineering by the University of Michigan at the commencement exercises held on June 16. The university had previously recognized Mr. Dow's achievements in the engineering field when in 1911 it conferred upon him the degree of master of engineering.

Obituary

Charles Knowlton, works manager of the Cleveland works of the Westinghouse Electric & Manufacturing Company for the past six years, recently died at his home in Cleveland. Mr. Knowlton became identified with the Westinghouse company in 1893, when he joined its ranks as foreman of the pattern shop. Previous to his connection with the Westinghouse company he was affiliated with the Union Switch & Signal Company at Pittsburgh. Mr. Knowlton was born in Woburn, Mass., fifty-nine years ago.

Frank B. Gilbreth, prominent industrial engineer, died of heart disease on Saturday, June 14, in a telephone booth in the Lackawanna station at Montclair, N. J. Mr. Gilbreth, who was an author of some note on industrial efficiency, was to sail for Europe last Thursday to take part in a large engineering enterprise in Poland. Just previous to his death he had been elected a member of the Masaryk Academy, Prague. A native of Fairfield, Me., he opened offices in Boston and later became president of Frank B. Gilbreth, Inc., New York. During the war he was a major in the Engineering Corps and served on the general staff at Washington. Mr. Gilbreth was the organizer of the Society for the Promotion of the Science of Management and a member of the American Society of Mechanical Engineers and of kindred societies.

Recent Court Decisions

Jury May Find that a Death Resulted from Electric Shock Despite Lack of Direct Evidence.—An assistant foreman was found dead before the plant where he worked had opened for the day's work. His body lay between a tool shop where electric power was used and the automobile in which he had ridden to work, and he had apparently been carrying an electric drill attached to a socket in the tool shop. In Texas Employers' Insurance Association vs. Shipley the question of whether he was killed from electric shock in the course of employment or died from heart disease or other cause while attending to his car was raised. The Court of Civil Appeals of Texas held that the jury was justified in maintaining the first hypothesis, although there was no evidence that the current was turned on or the tool defective. (260 S. W. 646.)*

Power Company, Though Not Liable for Inductive Interference, Has Duty to Telephone Company to Prevent Interference by Conduction.—A suit charging interference was brought in Oregon by the Yamhill County Mutual Telephone Company against the Yamhill Electric Company and dismissed. The Supreme Court of Oregon reversed the decree and remanded the suit for retrial, making a broad distinction between a power company's liability for conductive interference and its liability for inductive interference. Findings of the court in this suit were: (1) If two companies desire to use the highway for lines, they should be placed on opposite sides thereof. (2) The holder of a prior franchise has no exclusive right to the use of a street, and, so long as it is not disturbed in its occupancy, it must submit to such unavoidable and incidental inconveniences as may result from a fair and reasonable exercise of subsequent licensee's franchise, but it has a superior right to the extent that the subsequent licensee is under the duty so to construct its system as not unnecessarily to interfere with the prior licensee. (3) A power company lawfully maintaining along a highway a high-tension line constructed according to the best and most modern methods, so as to interfere as little as possible, with the operation of a previously constructed telephone line which it parallels, is not liable for inductive interference with the telephone system or for the cost of metallicizing the telephone line or constructing some device to prevent such interference. (4) A power company which connects its new high-tension line with an old dilapidated line with a grounded system, which allows the electricity to escape through the ground and interfere with a previously constructed telephone system by conduction, must eliminate the interference by proper construction and maintenance of its power line, the rule applicable to "conduction" being more strict than to "induction" because the interference by the former can be practically eliminated. (5) A suit to enjoin the construction and operation of a high-tension power line paralleling a telephone line without taking precautions against interference by conduction may be maintained in equity because the remedy at law would be inadequate. (224 P. 1081.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

Dollar Gas Held Unconstitutional.—The act of the New York State Legislature limiting the charge for gas in New York City to $1 per 1,000 cu.ft. has been declared confiscatory by Judge Winslow of the United States District Court, who thus supports the findings of the special master in the case. Judge Winslow, however, goes further than the master in declaring that the provision of the law calling for gas of not less than 650 B.t.u. is not separable from the provision prescribing the rate and that therefore both provisions must be enjoined. He not only holds the rate confiscatory, but states that the legislature, in eliminating a rate schedule fixed by the Public Service Commission before this schedule expired, violated a contract between the state and the companies. The decision was made in litigation instituted by the New York & Queens Gas Company, a subsidiary of the Consolidated Gas Company. An appeal to the United States Supreme Court is likely.

Measure of Damages for Breach of Contract of Central-Station Company to Purchase City's Equipment.—The Iowa Electric Company sued the town of Winthrop to recover payment for electrical energy furnished under contract. The Supreme Court of the state sustained the trial court in declaring the contract invalid because it had not been submitted to the voters as required by law. The company sued the town further to recover an agreed price for reconstruction of the municipal direct-current system and for depreciation of a certain motor. These liabilities were admitted by the town, which, however, claimed that the company had not paid to it a price agreed upon for its direct-current machinery, for which reason it had withheld all payments until it had "figured it was even" for the company's alleged failure in this respect. The court found for the defendant town, setting, however, the following measure of damages for the company's breach of contract: "Where an electric company agreed to purchase at a certain price defendant city's direct-current and electric equipment, which the company took into its possession after installing an alternating-current system, the obligation to purchase being dependent upon the condition that the old equipment should be in as good condition as on the date of the agreement, ordinary wear and tear excepted, the price agreed upon was the proper measure of damages upon company's breach of contract, but, if the old equipment was not in the condition agreed, the city was not entitled to recover at all." (198 N. W. 14.)

Commission Rulings

Invasion of Rural Territory Disapproved.—Permission to operate a second electric utility for the distribution of energy to persons living near a transmission line was denied by the Wisconsin Railroad Commission in a case affecting the Roscoe Electric Company. The commission said: "There is nothing in the testimony or evidence which would justify a finding that the electric companies now operating in the towns of Beloit and Rock under indeterminate permits are incapable or unwilling to provide reasonably adequate service at reasonable rates to the residents of said towns. Should the utilities fail in this duty, there is ample remedy for the interested patrons through the channels of this commission. It is the evident policy of the public utility law that there should be no competition in utility service unless unusual conditions prevail which make the entrance of a second utility necessary for public convenience. If the application in this case were granted, there is reason to believe that, instead of promoting public convenience, it might impair the same in some respects by depriving the more remote rural districts of the benefits which might be derived from the development of the more thickly settled portions by the same company."

Considerations Governing Contract of Power Company with Municipality.—In granting approval to a contract for electric service entered into between the St. Joseph Railway, Light, Heat & Power Company and the city of St. Joseph, the Missouri Public Service Commission laid down the following as underlying principles to be observed by it in the consideration of such contracts: (1) The commission has no authority to pass upon the question whether or not the people of a city should temporarily or permanently discontinue operation of a municipal lighting plant, in a proceeding to secure commission approval of a contract for service to the city by a utility. (2) Whether a rate fixed in a contract for electric service to a municipality is reasonable does not depend upon its relation to the cost to the city of the manufacture of its own electrical energy, but upon a comparison of the proposed rate with other rates made to other consumers of energy in the city, due regard being given to a proper classification of consumers. (3) A city, as a consumer of electricity, belongs in a different class from and should receive a lower rate than the average power consumer using the same amount of electricity, not on account of the public nature of the city, but because of the peculiar nature of the load and the time of day during which energy will be supplied. (4) The commission in approving a contract for electric service to a municipality has jurisdiction over only the rate feature.

Manufacturing and Markets

Devoted to the Discussion of Business and Economic Problems of the Producer and Distributor, with Market Reports, Trade Activities, Foreign and Construction News

Giving Jobbers' Discounts to Syndicates

Central-Station Operating Companies Do Not Perform Functions of a Wholesaler and Should Not Be Rated as Such in Price

BY A MANUFACTURER

IN THE long run the stabilization of the market for electrical appliances is one of the foundation stones of prosperity for manufacturer, jobber, central-station company and contractor-dealer. By the stabilization of the market I mean the maintenance of prices in fair competition on a plane which recognizes the service performed by each branch of the industry in producing, selling, supplying and servicing the goods involved and which concedes the wisdom of establishing and maintaining discounts in relation to this service. There is at present a lack of unanimity among appliance manufacturers, in particular with reference to selling to certain syndicates of central-station buyers, that makes against stabilization and consequently is injurious to the best interest of the industry. This lack of unanimity finds expression in the giving by some manufacturers of jobbers' discounts to these syndicate buyers.

JOBBERS' DISCOUNT FOR A SERVICE

The individual central station does not get this concession, generally speaking, and it should not receive it. The jobbers' discount is designed to recognize the jobbers' particular and special service in distribution—a service that the central station, like any other retailer, is not organized to perform. The jobber is the liaison officer of the trade. He stands in a strategic position, commanding a regional view of local distribution conditions and personnel which a manufacturer without a branch office cannot enjoy except through jobber connections. The manufacturer can do much to help the retailer by the visits of the former's representatives, the use of sales publicity material and by periodical or irregular factory meetings and inspections; but upon the jobber rests the responsibility for keeping credit information up to date, for maintaining suitable regional stocks, for keeping close contact with dealers and especially those of slender resources, and for performing constructive sales work more intensively throughout a territory than is feasible for the manufacturer to undertake "on his own" except where a factory branch office is warranted.

Now, I do not believe it is the function of the central station to act as a jobber, although in sporadic cases the utility has slipped a few sales across the line to retailers on a wholesale basis without much apparent thought of the harm of this practice in principle. It is true that the central-station company is a natural pioneer of new appliances, but as it is the only branch of the industry receiving continuous benefit from their use, on account of sales of electricity, it undoubtedly seems fair for the central station to do this very helpful work. Broadly speaking, the central station's stock of appliances is properly purchased and maintained for resale to the ultimate consumer. On special campaigns the central station may share its stock with local dealers on a basis permitting the dealers to meet the campaign price at a profit to the retailer. The central station, indeed, often does this. I do not think it has received its due appreciation from the other dealers in many cases for its co-operative attitude backed up by "honest-to-goodness" profitable sales terms.

Since it is not the central station company's function to wholesale appliances to other dealers in its territory, the utility should not receive the wholesaler's discount, but should have a retailer's discount based on the central station's real service in the cause of appliance distribution.

As I see it, the same reasoning applies to groups of central stations operated by syndicates. It does not seem to me to be all a matter of quantity buying. One can conceive of a syndicate managing a large number of utilities buying appliances perhaps exceeding in number those resold in a given period by a local or even a regional jobber. Substantially all these appliances are purchased by the syndicate to be put immediately or in stated lots upon retail shelves in the local properties.

VOLUME PURCHASES RECOGNIZED

Recognition of volume purchases may fairly be reflected in the overall sales price to the syndicate, and if there are steps enough in the quantity discount schedule, it may occasionally work out that the syndicate receives a lower price per article than the small jobber in a particular locality. But for a given volume of business expressed in appliance units purchased, I believe that the jobber discount should automatically exceed that of the syndicate. In other words, the jobber purchasing two thousand flatirons or toasters should receive a larger discount than the syndicate for this number of appliance units, although it might work out in practice, to use nominal figures for illustration's sake, that a syndicate purchasing ten thousand irons for retail sale on a score or so of properties might obtain a lower price per iron than a regional jobber purchasing, say, two thousand five hundred units.

The syndicate may contend to the manufacturer that it should have the jobbers' price discount because (1) the centralized direction of sales policy on the part of the commercial management of the utility group is an important and valuable service, and (2) because the advertising value of sales to the syndicate is an asset of no mean consequence. It seems to me that the chief benefit of centralized buying is recognized in cases where quantity discounts

are suitable to the situation, and that the advertising "equity" above hinted at is a good "talking point" but no ground for price concessions exists.

The real values lie in the goods produced and in the services rendered in their production and distribution, and it is to the best interests of the entire industry that the real jobber should prosper and not have his discounts "short-circuited" by the imposing connection of the syndicate's name with the marketing of a given appliance or line of electrical conveniences.

The Growing Importance of Factory Stock Analysis

How Excess Spare Parts, Superseded Types, the Lack of Standardization and Special Service Demands Influence the Situation

OVERHEAD costs are pressing so heavily upon electrical manufacturers at present that some of the best thought of the industry is being devoted to the reduction of this class of expenses. Factory stocks are coming in for a real "showdown" in this connection among the more progressive companies, and contact with all sorts of concerns producing electrical material and apparatus gives increased emphasis to the need of making these studies in many parts of the country and in many companies whose stocking-up policies have not yet been established on a firm economic foundation.

Spare Parts and Superseded Types

It is a "safe bet" that many manufacturers have few accurate data as to the annual variations in the cost of maintaining stocks of spare parts and of finished material in terms of percentage of overhead. A lump sum may be determined each year to express the inventory average value of stock on hand, and this is, of course, useful as a sort of base for figuring whether the total is reasonable or not in the general judgment of the management. But the industry needs more analytical information, and it is encouraging to find a manufacturer of refrigerating apparatus, for example, undertaking an investigation of the relation of his stock composition, volume and value at the factory to the volume and character of the company's business during the past ten years.

Electric motor builders are likewise interested in the problem of how much stock to keep on hand and how long to maintain stocks of superseded types for the convenience of the purchaser. In two cases manufacturers have expressed the opinion that from five to seven years is a fair answer to this last question, pointing out that after such a period the purchaser may properly be expected to pay the special apparatus price for replacements or even for belated extensions of the original equipment installation.

One manufacturer's opinion is that the cost of maintaining factory stocks may run up to 5 or 10 per cent of the total overhead. Whether this be true or not, the money value of overhead is now so impressive in many concerns that it will pay good returns to "go to the mat" on this question in a joint conference between the keenest minds of the sales, accounting, production and engineering departments. Where continuous and satisfactory records have been kept of the fluctuations in factory stock from time to time, a comparison of this information with the detailed sales and delivery record will point the way toward worthwhile savings.

Need for Standardization

A careful thinker in the public utility field recently advanced the opinion that much of the excess cost of living in the present time is due to the widespread demands of purchasers for rush order fulfillment. The volume of special designs still demanded in the field of electric motor applications is still amazing, notwithstanding the age of the motor branch of the industry. Industrial electric heating equipment makers are finding extraordinary difficulty in getting upon even an embryonic mass-production basis, and the maintenance of factory stocks in this field can be justified only after unusually thorough study of the trend of design, the popularity of smaller and relatively inexpensive types of heating equipment for very diversified service and the requirements of delivery situations.

It is trite to emphasize the economic value of buying standard products and of cutting down excess varieties, but the saving is potentially enormous, and the work of Secretary Hoover and his associates in this field, that of the Electric Power Club and of others too numerous to mention, has already contributed mightily to the welfare of the public and of the industries.

Special Service Aggravation

One of the chief reasons for maintaining factory stocks is obviously to render the highest-grade service to the purchaser, but in this connection the study of delivery records in the light of cold costs of stock maintenance will be illuminating to the executive. As time passes the amount of material necessary for emergency service on operating systems will be more accurately and more regularly determined. There is some hope that intelligent purchasers can be brought to anticipate their requirements more and more as the value of budgeting construction work for months ahead is more generally recognized and this practice adopted.

It is a question whether some manufacturers have not gone beyond reasonable limits in their efforts to render service to buyers spoiled by the overprevalent desire for immediate deliveries. "We want what we want when we want it" is a poor slogan for economic prosperity if it involves an excessive or a lop-sided factory stock, and the studies of stock history now under way or in prospect should furnish electrical manufacturers with data of the utmost value in relation to a more effective control of this section of overhead costs and a better co-operation on the part of purchasers in reducing this source of waste to more reasonable figures.

European Electrical Outlook Good

ELECTRIC manufacturing companies in Europe, particularly France and Italy, are doing much better business relatively than other principal lines of industry and the electrical outlook abroad is good, according to Anson W. Burchard, president of the International General Electric Company, who has just returned from Europe. Consid-

erable hydro-electric work is in progress in Italy and southern France.

Subsidiaries of the International General Electric in England, France and Italy are operating at capacity, says Mr. Burchard, and have enough orders to keep them busy the rest of the year. British and French concerns, however, are providing strenuous competition. There is much activity in the radio field in England, and British companies are doing a good business manufacturing radio material. Europe has improved economically, Mr. Burchard asserts, but the political situation is unchanged.

Business Conditions

A Survey of Important Developments in the Electrical Market Including Data on Production, the Sales Outlook, Credits, Exports, the Metals and Other Conditions Affecting Cost, Supply and Demand

MANY inquiries in the market continue to enliven the electrical industry, and although sales are slightly under last year's, the tendency is up and not down and business is holding up well. The demand from manufacturers of supplies has fallen off somewhat more, and the general expectation is that little increase can be anticipated before the fall. Railroad electrification is being actively discussed by manufacturers and railroad officials. Many interesting prospects are in view, but nothing is definitely known as to when business will accrue from first steps to realize them.

The sense of the industry as reflected at the convention of the Associated Manufacturers of Electrical Supplies this week clearly indicates the confidence of electrical men that in spite of the general business depression the outlook for the electrical industry is fundamentally good, and executives are planning for the conditions that will be met later when the market begins to build up. The "Do it electrically" idea, spreading and strengthening throughout the country, must react on sales.

Central-station buying has improved a little in New England. The general movement is upward but spotty, so that it is not shared in by all jobbers. In the New York district many inquiries are continually being received, but sales are still slightly below those of last year. Blowers and ventilating equipment are moving especially well. There are interesting prospects for large orders of steam generating equipment in the Southeast, where retail trade is quiet and very good fan sales have been made on account of the warm weather. In the Middle West trade apparently continues to improve, commodities are moving better and there is a good demand for high-tension equipment and pole-line hardware. Business is fair on the Pacific Coast and the present level is being maintained. Many maintenance orders are being received from fruit-packing plants in California and these are well distributed among contractors. Orders for material for the new California-Oregon transmission tie line have been placed to the value of nearly $100,000.

Stoker Sales Holding Up Well—Mostly of Moderate Size

AT THE present time unusually large contracts for stokers are not very plentiful as the past two years has shown large expansions in public utilities. Construction work on these various plants is now in process, and it will probably be some time before very much large business is in the market. Sales, however, are holding up well, and a leading manufacturer estimates that this year's business will be 75 per cent of last year's. Replacement business is about equal to last year's volume.

The sale of stokers of the underfeed type has lately shown much activity, and orders from France, China and the South have recently been received by one manufacturer. Canadian business has also been showing some life lately. Considerable interest in pulverized-coal applications is apparent in stoker-manufacturing circles, and at least one prominent maker has begun to advertise equipment of this type.

Prices are practically stationary, there being few changes. In the iron and steel industry there are small price concessions for immediate bookings. Delivery of the different lines is prompt, and shipments of ordinary contracts can be made in from thirty days to sixty days.

Generator Demand on Efficiency Basis—Trend to Larger Units

THE demand for moderate-capacity alternating-current and direct-current generators is about normal or possibly a little less active than one year ago. The average demand appears to be for somewhat larger capacities, and one manufacturer states that this is more noticeable in the case of direct-current machines, although no definite reason can be assigned. The demand for large-capacity generators, which are nearly all waterwheel-driven or turbine-driven, has fallen off this year—probably a natural reaction to the large volume of business transacted during the past four years. The total kva. sold by one company during the past four years is almost equal to that sold in the previous twenty years.

There has been a pronounced tendency toward the use of units of larger capacity, and as far as generating equipment goes the limit of this tendency is not in sight. It is possible that capacity of generating units will be limited to some extent by auxiliary equipment such as circuit breakers or other accessories. Apparatus is being sold more and more on an efficiency basis, and manufacturers are continually working toward better results.

Deliveries are good except in the case of industrial equipment, where the order is delayed until long after the engine is purchased. Manufacturers have no trouble in obtaining raw materials. The time required for delivery of corresponding machines has not changed to any extent over a long period of years, the reason being that while increased efficiency in manufacturing would normally have enabled machines to be built more rapidly, there have been so many refinements and special features for improving operation incorporated in modern generating units that these added features virtually offset any time which could be saved.

Present prices are approximately halfway between the prices of 1900 and 1914, and they appear to be stable. Last price revisions were made one year ago. No changes of a general nature are now contemplated.

Pole-Line Hardware Business Good Despite Less Extension

IN A FEW localities the buying of pole-line hardware—including crossarms, pins, braces and bolts—has fallen off, according to reports from manufacturers. However, most utilities are continuing their expansion programs and keep calling for pole-line hardware. For one manufacturer the month of May was one of the best in the company's history, which was explained as due to utility extensions in the West and Southwest and the replenishment of jobbers' stocks. Another organization declared that while its volume of business was about 70 per cent of that obtained during the same period in 1923, the present conditions were satisfactory since it was able to run its rolling and galvanizing mills at capacity with small orders from many outside sources.

Although there is a noticeable tendency on the part of some utilities to hold off extension work and construct only that which is necessary at the present time, a more positive tone comes from the jobbers out in the field. They are now purchasing standard line hardware, for which there is a normal demand because their shelves have been fairly well cleaned out. They have been subsisting on their stocks until now, when utilities and industrial firms are requiring prompt deliveries. This buying has served to offset some of the lessened business activities in other parts of the country.

Another item of interest is the amount of business which will come from the railroads now that the Interstate Commerce Commission has ordered signal train-control systems. This will open a new field of business for pole-line hardware. Since 10 per cent of this work must be completed in 1924, some manufacturers are beginning already to receive orders from the railroads in considerable quantity.

Regarding production and deliveries of pole-line equipment, all manufacturers state that their facilities are unhampered by any scarcity of either material or labor. Ample material is available for utilities planning summer or fall extensions. Prices have not changed materially since early spring. While the future may bring forth changes warranted by economic con-

ditions, manufacturers do not believe that these price adjustments will go below levels maintained previous to the last increase. At the present time prices are firm.

Little Demand in Metal Market—Few Price Changes

THERE was no great demand for any of the metals this week, and the volume of business transacted was somewhat smaller than the previous week. Prices have remained practically the same, as advances made, due principally to the strengthening of the London market, have been lost in the last two days.

Copper was sold at 12½ cents delivered practically all through the week, although on the seventeenth the largest volume of sales was at 12⅝ cents. The current rate of production was again above the volume of business. Foreign sales have been very good, particularly to France. Copper consumption in the United States continues on a large scale, but heavy production holds prices on the low level.

NEW YORK METAL MARKET PRICES

	June 11, 1924 Cents per Pound	June 18, 1924 Cents per Pound
Copper, electrolytic	12⅛	12⅛—12⅛
Lead, Am. S. & R. price	7.00	7.00
Antimony	8⅛	8⅛—8⅛
Nickel, ingot	27	27
Zinc, spot	6.15	6.10—6.15
Tin, straits	42	43⅛
Aluminum, 98 to 99 per cent	28	28

Lead has not been active, but the price remains the same as producers have little to offer. Small quantities of lead in individual lots are available at 7 cents, but most producers are asking from 7⅛ cents to 7¼ cents.

Galvanizers have shown little interest in the market and the demand for zinc has been small. The price has remained about the same. Occasional export shipments are being made.

Tin prices have further advanced in unison with the market abroad. There has, however, been no demand.

Tendency for Business to Improve in New York District

IN THE New York district many inquiries are being received and the tendency is for business to improve. Sales are holding up well, but are slightly under last year's figures. Central-station purchasing is still off. It is noticeable that practically all orders received are for material needed to fill immediate requirements only, and no orders are being received for stock goods It is known that officials have definitely issued orders to this effect. Keen competition exists in all lines, with resultant price cutting.

An interesting order was placed by a Pennsylvania power company early this week for poles amounting to approximately $20,000, and also one for cross-arms amounting to approximately $5,000. Only a few other orders were placed during the week for poles and pole-line material, although the market has been very active within the past few weeks, the railroads in particular having purchased heavily. However, it is not unusual at this period of the year for utilities to reduce orders for this type of material. In the latter part of last week a 10 per cent reduction was made in the price of cross-arms.

One manufacturer also reduced sheet brass ½ cent per pound this week, as well as brass tubes ½ cent and sheet copper ¾ cent per pound.

Some increase has been noted during the past two weeks in the sales and inquiries for blowers, ventilating equipment and exhaust fans. This improvement has, no doubt, been considerably assisted by the power show held by the New York Edison Company recently. Building material for residential use is moving very well, though there is not much demand for conduit and fittings. Some decrease in lamp sales is noticeable and can be attributed to industrial slackening off, daylight saving and reduced lamp prices. Appliance sales are reported by one jobber as being equal to those of last year. Jobbers continue the policy of cautious buying.

Central-Station Purchasing Good in Southeast—Fan Sales Large

CENTRAL-STATION purchases continue to hold up well in the Southeastern district, and there are prospects of orders being let for a considerable amount of steam generating equipment, one from the Carolinas being of particular note. Heavy construction materials, particularly conduit and fittings, are in excellent demand, while several large panelboard and switchboard orders have been reported during the past week. While house-wiring materials are still moving satisfactorily, there is some slowing up to be noted.

The textile situation is showing some signs of life, more especially in the direction of improvements and expansions to mill properties, with the result that an unusual number of inquiries have been received during the past week. Indication of more activity in the manufacturing industry is noticed in Tennessee by the increasing power load which has not only recovered from the slump suffered a month ago but his increased.

The recent warm weather has served finally to start the movement of fans, and sales have been most excellent. In fact, one of the largest jobbers states that his sales volume to date is almost equal to the total last season.

The trade in small electrical appliances and retail business generally is somewhat quiet. There is little demand for dry cells, particularly of the radio type.

Better Tone Noticed in New England Trade

CENTRAL-STATION buying has improved a little in the New England district during the past fortnight and purchases from jobbers are somewhat more active in connection with the building industry. The distribution of business is spotty, and not all jobbers are sharing in the upward movement which seemed to start immediately after Congress adjourned. One or two large houses report better business than last year and the sale of fixtures for both residential and industrial use is on a very satisfactory scale.

In the appliance field washers are moving well and electric ranges exceptionally fast considering previous records in this territory. Prices are fairly steady on staple commodities, although rubber-covered wire is weak owing to sharp competition. Electric motor sales are off compared with a year ago, possibly 30 per cent, owing to the curtailment of operations in the textile industry, and competition for motor business is acute.

Trade in Middle West Showing Some Improvement

BUSINESS in the Middle Western territory apparently continued to improve this week. Commodities in general are moving better and the feeling in electrical circles is optimistic. Quotations are being made for larger quantities of merchandise and bigger projects are being planned. Demand for most commodities, however, is still limited to immediate requirements or a thirty-day stock, but the demand appears more constant than previously. Central-station construction continues to uphold general business, and maintenance purchases are increasing. High-tension equipment demand has been good, seconded by pole-line hardware. Distribution equipment has moved in considerable quantities, and there has been an excellent call for watt-hour meters. Prices generally are stable.

Building continues good in Chicago, as evidenced by the number of building permits taken out. Last week 378 permits were obtained for a value of $12,933,500, as against 274 permits in the same week last year for a value of $3,961,000.

Business Fair on Pacific Coast—Level Being Maintained

BUSINESS on the Pacific Coast as a whole is considered fair. It has apparently reached a certain level which is being maintained despite the political situation and such exceptional handicaps as the recent dry spell, which has seriously affected the purchasing power of the industry, and the remedial measures which Los Angeles is applying in the endeavor to check real-estate speculation. This last factor will probably affect southern California electrical business for the remainder of the year, but it should make for stability in the future.

Many maintenance orders, well distributed among electrical contractors in the interior, have been received from fruit-packing plants. However, the oil companies are purchasing little except some electrical equipment to be used in new service stations. Among important orders placed are a hundred-thousand-dollar annual lamp contract which has been awarded by the Southern Pacific Company; also, two orders, one amounting to $80,000 for high-tension insulators and another for $15,000 worth of pole-line hardware, which materials are to be used for the California-Oregon transmission tie line. Prices have become more stabilized and dealer's meetings have been noticeably better attended.

Activities of the Trade

Devoted to News of the
Manufacturer, Jobber, Agent, Contractor and Dealer, Including Important Orders and Contracts for Apparatus and Equipment

Westinghouse Business Holding Up Well

Orders received by the Westinghouse Company for the first two months of its fiscal year, beginning April 1, indicate that the bookings for the first quarter will be somewhat in excess of the $37,755,000 shown in the three months ended March 31. Orders received in both April and May were larger than those of the previous months of the year. It is expected that total business for the year ending March 31, 1925, will approximate that of last year. Although there has been a decrease in business as compared with the corresponding period a year ago, this decrease has not been of sufficient volume to affect materially the operation of the company.

Carney Shipping Poles to Mexico and Honolulu

Indication that foreign buyers are seeing the economic value of American manufactured and butt-treated poles is contained in the announcement by E. B. Brande, Eastern office manager at Grinnell, Iowa, of B. J. Carney & Company, that 1,650 poles, 30 ft. to 40 ft. in length, have been shipped to a mining company at Chihuahua, Mexico, and one thousand 35-ft. poles to Honolulu.

Habirshaw Now Shipping High-Voltage Cables

The Habirshaw Electric Cable Company, Yonkers, N. Y., is now shipping an order for 7,560 ft. of three-conductor, 350,000-circ.mil, 33,000-volt submarine cable to the Union Electric Light & Power Company, St. Louis, to be used in the Mississippi River. Special reels, six of which will be used, are necessary to accommodate the cables. Each empty reel weighs 2 tons and will contain 1,260 ft. of cable. The net weight of wire on each reel is 15 tons. The outside cable diameter is 4½ in.

An order for 36 miles of single-conductor, 500,000-circ. mil, 40,000-volt cable is also now being shipped to the Columbus Railway & Light Company, Columbus, Ohio.

Whiting Corporation Furnishes Large Electric Traveling Crane

Two 125-ton electric traveling cranes with unusually long spans for cranes of such large capacity were recently built by the Whiting Corporation, Harvey, Ill., for the turbine room of the Commonwealth Edison Company's Crawford Avenue power station, Chicago. One of the girders used on the cranes without machinery parts measures 124 ft. long and 8 ft. 4 in. deep and weighs 134,000 lb. The complete crane with all operating machinery in place weighs 375,000 lb. The main hoist has a capacity of 125 tons; auxiliary hoist, 10 tons. The span is 122 ft. 4 in. and the lift 69 ft. Eighteen cars were required to make the total shipment.

Apollo Metal Works to Triple Facilities

The Apollo Metal Works, La Salle, Ill., manufacturers of "Apollo nickel-zinc" and other nickeled, coppered and brass-finished sheets, etc., for manufacturing purposes, at the recent annual meeting of the stockholders and directors completed plans to triple the size of the present works. Ground will be broken within the next ten days on the company's property, Zinc Street and Porter Avenue, preparatory to erecting a large fireproof addition which will afford room for a plant three times the present size. The Apollo Works have been operating on a twenty-four-hour schedule during the recent months and by extending their equipment they hope gradually to get back to the single-shift basis.

Electric Smelter May Be Erected at Idaho Springs, Col.

R. S. Wild, representing the Wild Electric Furnace & Engineering Company of New York, met with the mining men of the city of Idaho Springs, Col., on May 21 and offered to erect an electric smelter and to have it in operation before January, 1925, if the Bureau of Mines of Idaho Springs would guarantee at least 50 tons of ore daily. The company does not ask for any financial aid.

The miners assured him that they could offer him double what he asks and said that if the smelter was erected they felt certain that the company could obtain as much as 200 tons of ore daily. Idaho Springs is on the railroad and there are many more mining towns on the same line. It is believed that the various communities would be glad to ship their ore to the Wild smelter should the project materialize.

Westinghouse Receives Orders Including 50,000-Kw. Generator

The Westinghouse Electric & Manufacturing Company has received an order from the United Electric Light & Power Company, New York, for a cross-compound turbo-generator unit to cost approximately $750,000. The generator has a rating of 50,000 kw. at 80 per cent power factor. The unit is to be installed early next year.

The company has also closed a contract with the Brooklyn Edison Company for regulators and switching equipment amounting to approximately $325,000.

General Electric and De Laval Furnish Pumping Equipment

The De Laval Company has furnished three centrifugal pumps for use at the Bay-Pulgas pumping plant, an important addition to the water supply of San Francisco. Two of these pumps operating continuously will have a capacity to deliver the required 25,000,000 gal. of water daily.

These pumps are each driven by a 500-hp., 1,200-r.p.m., 4,000-volt, three-phase, 60-cycle induction motor supplied by the General Electric Company. This company is also furnishing three 4,000-volt floor-mounted compensators and six panels of switching equipment to be used in connection with these motors.

The Rathbun Manufacturing Company, Jamestown, N. Y., manufacturer of electrical specialties, has acquired space in a two-story brick plant on Steele Street and will continue to manufacture electrical goods at that place. The plant was formerly in Rose Alley.

The Ren Manufacturing Company, Winchester, Mass., is now manufacturing a lamp lock known as the "Ren-Lock," which is a simple device that fits any standard bulb and any standard brass socket. It consists of only two parts, a coiled spring with a projecting end fitting within a groove in a black fiber washer.

W. R. Pender, 1408 Dallas Avenue, Houston, Tex., power-plant engineering, operation and construction, announces that he has recently released the manufacturing rights of his new line of oil-burning furnaces and boiler equipment to the Marion Machine Foundry & Supply Company, Marion, Ind. This has been done to increase the distribution facilities and to give better service to the trade.

Ludwig Hommel & Company, jobbers and lighting-fixture manufacturers, on June 7 last formally opened their six-story building at 929 Penn Avenue, Pittsburgh.

The Mitchell-Rand Manufacturing Company, New York, announces the appointment of Edward J. Watson, who will call regularly on customers and prospective customers in Pennsylvania and the Southeastern States to discuss their problems and suggest service that the company can render as manufacturers and distributors of "everything in insulation." Mr. Watson will have his headquarters at Philadelphia.

The General Electric Company on June 2 last distributed to 9,177 employees at its Schenectady works approximately $130,000. This amount represented their return for the six months ended June 1 on savings which they had put to work by investing them in the General Electric Employees' Securities Corporation.

The Audiffren Refrigerating Machine Company, 90 West Street, New York, is now offering an electric ice-cream cabinet entirely cooled by air and which uses no other refrigerant. A thermostat controls the proper temperature. A ½-hp. motor is used and under average temperature conditions will consume a little less than 6 kw.-hr. per day.

The Reliance Automatic Lighting Company, 520 College Avenue, Racine, Wis., has brought out a time switch for turning on and off window lights, signs, etc. It is made in three types for 10 amp., 20 amp., and 30 amp., 250 volts or less, single-pole and double-pole.

The Matthews Engineering Company, Sandusky, Ohio, is now offering a new line of light and power plants with full automatic, semi-automatic and hand control. The models have the same engines and generators, except that an automatic choker is provided on the full automatic type. A General Electric generator is used.

The Economy Fuse & Manufacturing Company, Chicago, announces the appointment of Morgan P. Ellis as general sales manager. Mr. Ellis has been assistant general sales manager for the past eight years.

The Lincoln Electric Company, Cleveland, announces the appointment of Gordon W. First as manager of the New England sales office, with headquarters at 10 High Street, Boston.

The Russell Electric Company, Chicago, manufacturer of electrical appliances, announces the manufacture of a new patented Marcel waver which is intended to take the place of the gas-heated tongs used by "beauty parlors."

The Waugh Electrical Company has opened offices in the Jefferson Building, Philadelphia, and will specialize in industrial lighting and power installation. J. T. Waugh, president, was formerly assistant electrical engineer with the New York Central Railroad, at New York. He was also in charge of the illumination work at the Hell Gate station of the United Electric Light & Power Company and the Hudson Avenue station of the Brooklyn Edison Company.

The International Combustion Engineering Corporation, through the Vickers & International Combustion, Ltd., of London, has received an order for pulverized-fuel equipment and accessories for a large municipal plant in Birmingham, England. This is the first large installation of its kind in England.

The Plume & Atwood Manufacturing Company, Waterbury, Conn., manufacturer of fixture parts and trimmings, etc., is taking bids on a revised layout of a four-story building of slow-burning mill-type construction to be used for storage purposes. It will have 25,400 sq.ft. floor space. In addition there will be constructed a brick and concrete stair and an elevator tower of five stories. Westcott & Mapes, Inc., of New Haven are the designing engineers.

The Atwater Kent Manufacturing Company, Philadelphia, manufacturer of radio apparatus, electrical equipment, etc., is now removing its plant from 4937 Stenton Avenue to its new works at Wissahickon Avenue and Abbotsford Road.

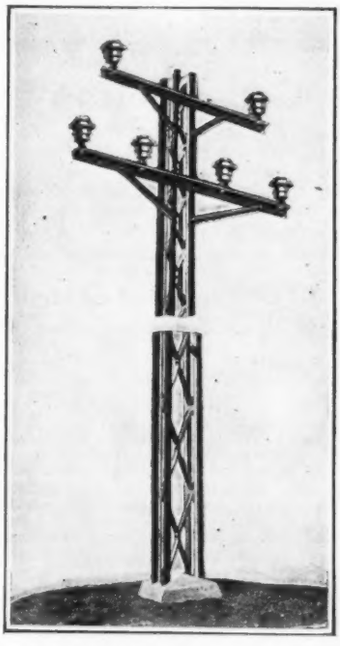
The General Electric Company has received an order for eighty-one electrically operated flowmeters from the Sanitary District of Chicago. Three of these meters are for sewage and the others for the purpose of measuring the air used in the sewage treatment.

New Equipment Available

Short Descriptions of New Apparatus and Accessory Equipment of Interest to the Electrical Industry and Available from Manufacturers and Announcements of New Lines

Steel Pole

A steel pole for use on transmission and distribution lines, telephone, trolley and street-lighting systems, etc., made by being pressed from 5-in. to 12-in. steel channels or I-beams, is being placed on the market by the Truscon Steel Company, Youngstown, Ohio. A portion of the web of the channel or I-beam is pressed out to a predetermined angle and this pressed-out section is riveted to a like section of another channel or I-beam, as shown in the illustration.



POLE MADE FROM TWO STEEL CHANNELS, HAVING PRESSED OUT SECTIONS, RIVETED TOGETHER

All sizes of steel poles can be furnished up to 50 ft. in length. Where more than ordinary strength of pole and extra length is required, the pole can be made in combinations of two or more. A complete line of fittings has been designed for the steel pole to fit any size of standard cross-arm, either wood or steel.

Electric Crane

A "locomotive-type" storage-battery crane for handling sheet steel and using electric drive for all operations, power being supplied to the cable drums by one motor through magnetically operated clutches, has been placed on the market by the Baker R & L Company, Cleveland. The crane has a 60-in. wheel base and an 8-ft. boom and can be run inside a standard box car.

It can handle a 3,000-lb. load of sheet at a 7 ft. radius, carry it to the storage pile and stack it. The only change in the loading of steel in the cars which this method requires is the placing of 1-in. strips of lumber between the sheets to separate them into 3,000-lb. bundles. The crane is also suitable for handling other commodities from cars.

Service Watt-Hour Meter

A new service type of direct-current watt-hour meter made in 5-amp. and 10-amp. sizes, two-wire and three-wire ratings, weighing only 6 lb. 6¼ oz. and known as the type C-15, has been placed on the market by the General Electric Company. The meter is also provided with a thin cast-alloy back or base, bottom connections with separate terminal compartment and removable terminals. The same damping magnets and register are used as on standard-service-type alternating-current meters, together with armature and shunt-field coil similar to those used with the type C-6. Its over-all dimensions are 11 53/64 in. x 5 5/16 in. x 5 1/16 in.

Automatic Circuit-Breaker Mechanism

An automatic closing and reclosing electrically operated mechanism for oil switches and circuit breakers, indoor or outdoor, for use on direct current or alternating current and particularly adapted to unattended substations, has been developed by the Condit Electrical Manufacturing Company, South Boston, Mass.

The mechanism can be used with any type or make of breaker, is self-contained and consists essentially of a motor which through a system of gearing actuates an operating spring or springs. Releasing the spring closes the breaker or breakers. Various attachments, such as trip-free mechanism and automatic reclosing, may be added to meet individual requirements. One or more closing cycles with constant or varying time delay can be employed. A single mechanism can be arranged to operate one or more indoor breakers for closing simultaneously or individually.

Pipe Fittings.—A complete line of structural pipe fittings made of high-grade malleable iron has been placed on the market by the Westinghouse Electric & Manufacturing Company. They are designed for use with common wrought iron or steel pipe in the erection of outdoor or indoor electrical switching equipment. They are primarily intended for electrical installations, but are equally applicable to the construction of racks, railings and bench or table frames, etc. The fittings are of the clamp type and consist of a relatively few unit castings producing a large variety of useful combinations for fulfilling nearly all requirements.

New Trade Literature

INSULATION TESTING. — "Principles and Practice of Insulation Testing" is the title of a pocket manual just issued by James T. Biddle, 1211 Arch Street, Philadelphia. The booklet makes special reference to the "Meg" insulation tester and describes the measurement of insulation resistance. Directions for making various insulation resistance tests are also given, and the "Meg" insulation tester is described.

METERING TRANSFORMERS. — "Weatherproof Metering Transformers for Metering Current on the Hi-Side" is the title of bulletin No. 208-A, issued by the Packard Electric Company, Warren, Ohio, covering the "Packard" weatherpoof metering transformers. It contains photographs showing various metering transformers (combined units) and curves which represent typical characteristics of the various voltage lines of metering transformers, both current and potential.

FLUSH PLATES.—Bulletin No. 17-20A issued by Harvey Hubbell, Inc., Bridgeport, Conn., covers the Hubbell flush plates.

FUSE AND DISCONNECTING SWITCHES.—The W. N. Matthews Corporation, St. Louis, is distributing bulletin No. 500, covering the Matthews switches and disconnecting switches. This is the first of a series of new bulletins that will be issued by the company, one on each Matthews specialty.

ELECTRIC VENTILATION.—The American Blower Company, Detroit, has issued bulletin No. 1,229 on electric ventilation. This booklet contains instruction and suggestions to electrical dealers regarding building a market for ventilating fans. Instructions for installing American blower fans and units in various business places are given and also illustrations showing typical installations of American blower fans.

LIGHTING EQUIPMENT. — The Curtis Lighting, Inc., 1119 West Jackson Boulevard, Chicago, is distributing serials Nos. 441, 453 and 454 on color lighting, floodlighting and the No. 5,801 luminous-bowl unit respectively.

VACUUM CLEANERS.—"Carpets and Rugs" is the title of a 168-page book published by the Hoover Company, North Canton, Ohio. The book deals in a most interesting way with the manufacture of carpets and rugs, their selection and the use and care of them. Although it contains fourteen chapters, only a very small part of the last chapter is devoted to the Hoover suction sweeper and its application to carpet cleaning. The book is a valuable treatise on the subject of carpets and rugs.

INCLOSED CIRCUIT BREAKER. — A handbook on "U-re-lite," the circuit breaker in the steel box, has just been issued by the Cutter Company, Philadelphia. The handbook describes the different types of "U-re-lites" manufactured and their features, with dimension sheets covering each type. A number of photographs showing various installations are also included in the handbook.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number.

An agency is desired in Bahia, Brazil (No. 10,592), for electrical supplies.

An agency is desired in Calcutta, India (No. 10,598), for electric fans, ceiling and table electric lamps and other appliances and for radio sets.

Purchase and agency are desired in Lisbon, Portugal (No. 10,601), for electrical machines and supplies.

Purchase and agency are desired in Johannesburg, South Africa (No. 10,599), for electrical meat mincers and slicers and for radio apparatus and parts (No. 10,597).

Purchase and agency are desired in Melbourne, Australia (No. 10,600), for electric motors, 200 volts to 400 volts, single-phase.

An agency is desired in Budapest, Hungary (No. 10,571), for radio broadcasting apparatus.

Purchase and agency are desired in Gothenburg, Sweden (No. 10,566), for welding and cutting apparatus, oxyacetylene and electric, and insulating material for steam and heat conduits.

ELECTRIC POWER STATION PROPOSED AT COLENSO, SOUTH AFRICA. —Plans are being considered for the construction of an electric power station at Colenso, Natal, South Africa, to supply electricity for the Glencoe and Maritzburg Railway.

BUSHING INSULATORS FOR MORWELL (AUSTRALIA) POWER SCHEME. —The State Electricity Commission of Victoria, Melbourne, Australia, will receive tenders until Sept. 15 for bushing insulators for 6,600-volt trifurcating boxes (Specification No. 24/38) for the Morwell power scheme.

New Incorporations

THE NOLICHUKY POWER COMPANY, Greenville, Tenn., has been incorporated with a capital stock of $50,000 by L. J. P. Bohannon, W. H. Reaves and John A. Park.

THE WEBER POWER & ELECTRIC COMPANY, Lakeview, Idaho, has been incorporated with a capital stock of $100,000 by A. H. Weber and others.

THE VIRGINIA-NORTHERN POWER COMPANY, Warrentown, Va., has been organized with a capital stock of $250,000. The officers are Joseph W. Henderson, president, and Cyrus W. Beale, secretary.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

BANGOR, ME.—The Bangor Hydro-Electric Company, recently chartered with a capital of $10,000,000, is arranging to take over and consolidate the Bangor Railway & Electric Company, Bangor Power Company, Bar Harbor & Union River Power Company, and the Lincoln Light & Power Company, Ellsworth, with affiliated interests. A number of extensions in transmission lines are contemplated. Edward F. Freese is president.

WINOOSKI, VT.—Plans for the proposed new local lime plant to be erected by Brewer & Company, Inc., Worcester, Mass., to cost about $100,000, include a power house.

IPSWICH, MASS.—Council has issued $20,000 in bonds, the proceeds to be used for improvements to the municipal electric system.

Middle Atlantic States

BALDWINSVILLE, N. Y.—The Seneca River Power Company has applied for permission to extend its lines to Three Rivers. Later, it is understood, the company plans to extend its lines to Belgium and thence back to Baldwinsville.

BUFFALO, N. Y.—The Department of Public Works is considering the installation of ornamental lamps on Jefferson Avenue, to cost about $10,000.

GREEN ISLAND, N. Y.—The installation of an ornamental lighting system on George Street is under consideration.

JAMESTOWN, N. Y.—Bids will be received by the Board of Public Utilities, City Hall, until July 1 for air-cooling machinery, etc., for the generators at the new municipal electric plant at Steele Street.

NEW YORK, N. Y. — Electric power equipment will be installed in the new market and storage building to be erected at Exterior and East 151st Street, to cost about $2,500,000, by the Department of Public Markets.

PAVILION, N. Y.—The installation of a street-lighting system, to cost about $7,500, is under consideration.

NEW YORK, N. Y.—Bids will be received by the Park Board, Department of Parks, Municipal Building, until June 26 for alterations and additions to the electric generating plant of the American Museum of Natural History, Manhattan Square, Borough of Manhattan, including a new engine, electric generators, electric wiring, steam piping, etc.

NEWARK, N. J.—The Newark Sugar Refining Company, recently organized, with temporary office at 765 Broad Street, plans to install electric power equipment at its proposed refining and distributing plant in the Port Newark section, to cost about $1,500,000.

ALLENTOWN, PA. — Officials of the Pennsylvania Power & Light Corporation are organizing a subsidiary, to be known as the Franklin-Lycoming Power & Light Company, to construct and operate an electric system in Franklin Township.

ANNVILLE, PA. — The Annville & Palmyra Electric Light Company expects to erect a few rural-line extensions. D. K. Bomberger is manager.

CHAMBERSBURG, PA. — The Guilford Electric, Greene Township Electric, Hamilton Township Electric, Antrim Electric and Letterkenny Electric companies have been organized by local interests to construct and operate transmission lines in Franklin County. C. H. Letham, Hagerstown, Md., is treasurer.

HARRISBURG, Pa.—Bids will be received by the Department of Property and Supplies, Capitol Building, until July 9 (extension of date from June 10), for alterations and extensions in the present power plant in the Capitol Building, including a drinking-water refrigeration system. Arnold W. Brunner, 101 Park Avenue, New York City, is architect.

HAWLEY, PA.—The Pennsylvania Power & Light Company has received a preliminary permit from the Federal Power Commission to construct a hydro-electric generating station on Wallanpaupack Creek, near Hawley, to reach an ultimate capacity of 54,000 hp. The cost, including a steel-tower transmission line, is estimated at about $6,000,000.

HOLTWOOD, PA. — The Pennsylvania Water & Power Company plans to erect a double-circuit steel-tower transmission line from Holtwood to Lancaster, designed for 100,000 volts, initial operation to be at 70,000 volts, three-phase, 60 cycles, to be completed next fall, and an outdoor substation at Lancaster with an initial installation of 30,000 kva. A new steam-power plant is being erected at Holtwood, the initial installation to consist of two 10,000-kw. General Electric turbo-generators.

LANCASTER, PA.—The Edison Electric Company has applied for permission to issue $200,000 in bonds, part of the proceeds to be used for extensions.

MILLVILLE, PA.—The Millville Electric Light Company contemplates erecting a transmission line to Benton and Turbotville, and also to rebuild its local distribution system. Doyle Greenly is superintendent.

PITTSBURGH, PA.—The South Pittsburgh Water Company, 238 Brownsville Road, contemplates extensions and improvements to its system, including the installation of additional pumping machinery, to cost about $500,000.

PITTSBURGH, PA. — The Indiana, Hampton, O'Hara and Harmar Township Light companies are being organized by local interests to construct and operate transmission systems in the respective districts for which they are named. The companies are represented by A. W. Robertson and J. R. McNary, 435 Sixth Avenue, Pittsburgh.

ANNAPOLIS, MD.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until June 24, for 16,000 ft. electric wire (Schedule 2346).

EASTON, MD.—Bonds to the amount of $7,000 have been issued for the erection of a transmission line and distributing system.

WARRENTON, VA. — The Virginia-Northern Power Company plans to erect a transmission line to Culpeper and Orange, where electric properties have been acquired. Additional generating equipment will be installed and the distributing system at Culpeper changed from direct current to alternating current.

WASHINGTON, D. C. — The supply officer, Navy Department, has been authorized to purchase two motor-generators and three 25-kva. transformers (N.S.A.F. req. 582).

WASHINGTON, D. C.—Bids will be received by the Chief Signal Officer, United States Army, until June 23, for two telephone switchboards (Circular CP-18185-1).

WASHINGTON, D. C.—Bids will be received by the Board of District Commissioners until July 2 for 8,823 ft. telephone cable.

North Central States

ARDIAN, MICH.—The City Commission has authorized the installation of new street lamps in the downtown and Tecumseh Street business districts. The plans provide for the fifty-nine lamps, to cost about $7,000.

EASTLAKE, MICH. — The Consumers' Power Company, Jackson, has been granted permission to install a street-lighting system here.

OVID, MICH.—The Consumers' Power Company, Jackson, has secured a thirty-year franchise for light and power service, and plans to erect a transmission line to supply electricity here. The municipal power plant will be closed down.

PORT HURON, MICH.—The City Commission has authorized an extension of the ornamental lighting system on the principal streets in the city.

ASHTABULA, OHIO. — The Suburban Utilities Company has applied for permission to acquire the Lake Erie Light & Power Company, Geneva-on-the-Lake, and the Saybrook (Ohio) Light, Power & Water Company, operating near Ashtabula. Line extensions are contemplated.

CATAWBA, OHIO.—Negotiations have been completed by the J. H. Bellows Company, Catawba, for the erection of a transmission line from the power house of the Northwestern Ohio Railway Company, Port Clinton, to the Catawba Cliffs.

DEFIANCE, OHIO.—The Toledo Edison Company is negotiating for the purchase of the properties of the Defiance (Ohio) Gas & Electric Company, Holgate (Ohio) Light & Power Company and the Swanton (Ohio) Light & Power Company, and will consolidate them with its system. Extensions are contemplated.

EATON, OHIO.—The installation of an ornamental lighting in the business district is under consideration.

MARION, OHIO.—The Columbus, Delaware & Marion Electric Company contemplates the installation of a 15,000-kva., three-phase, 60-cycle, 13,200-volt turbine this year. L. C. Stang is superintendent of light and power department.

MARTIN'S FERRY, OHIO.—The City Council is considering the construction of a combined water and electric plant, the latter to have a capacity of 2,000 kw. A. Kelsey is superintendent.

PORT CLINTON, OHIO. — The Northwestern Ohio Power Company, Toledo, is planning to take over the properties of the Northwestern Power & Railway Company and the Port Clinton Electric Light & Power Company. Extensions and improvements are contemplated.

WOODSFIELD, OHIO.—The Board of Electric Light Commissioners contemplate the erection of several transmission lines and extension to the street-lighting and secondary service this year. H. A. Carver is manager.

LOUISVILLE, KY.—The Board of Public Works contemplates the installation of an ornamental lighting system on Fifth Street from Jefferson to Market Street, and on Liberty, Walnut, Guthrie, and Chestnut Streets, to cost about $25,000.

ELNORA, IND.—The Owensboro, Rockport & Chicago Railway Company plans the construction of a steam-operated electric generating plant and a number of substations in connection with the installation of an electric line from Owensboro to Elnora, about 85 miles. The entire project will cost $6,000,000. Thomas H. Hazelrigg, 1227 West Twenty-ninth Street, Indianapolis, is consulting engineer.

GOSHEN, IND.—The Interstate Public Service Company is negotiating for the purchase of the system of the Winona Service Company, operating an electric traction line from Goshen to Peru. Extensions are planned. The Interstate company will furnish service for the railway in the future.

NORTH WEBSTER, IND.—The North Webster Light & Water Company contemplates extensions to its system, to cost about $15,000.

DIXON, ILL.—Arrangements are being made by the Illinois Northern Utilities Company for the construction of a new hydro-electric plant on Rock River this year to replace the present plant. The cost is estimated at $660,000.

GREEN BAY, WIS.—The City Council is considering the installation of ornamental lamps of not less than 600 cp. in the downtown section of Main Street.

MENASHA, WIS.—The water and light committee has submitted to the Council a report recommending improvements to the municipal electric and water plants, to cost about $20,000. The work will include an addition to the power station and the installation of generators and transformers.

RACINE, WIS.—Plans are being prepared by the Wisconsin Gas & Electric Company for extending its high-tension lines in various parts of Racine County to supply electricity in the village of Husher and farming communities in that section.

WAUSAU, WIS.—Arrangements are being made by the Wisconsin Valley Electric Company for extending its transmission line from Jordan to the towns of Sharon and Polonia, a distance of 4 miles.

WAUSAU, WIS.—The Wisconsin Valley Electric Company has been granted a permit to construct a dam and power plant on the Wisconsin River in the cities of Scott and Merrill. The plans call for a development of about 7,500 hp., to cost about $200,000.

ALBERT LEA, MINN. — The Southern Minnesota Gas & Electric Company has started work on an addition to its local plant. Two additional boilers of 875 hp. will be installed.

BLOOMING PRAIRIE, MINN. — The Southern Minnesota Gas & Electric Company is negotiating with the Village Council for the installation of a new street lighting system. Transmission-line extensions will be made.

ST. PAUL, MINN.—Bids will soon be called for the construction of a power plant at Macalester College, to cost about $50,000. William M. Ingeman, Endicott Building, St. Paul, is architect.

TOWER, MINN.—The Minnesota Power & Light Company, Duluth, has been granted a franchise to erect a transmission line from Soudan Mine to Tower.

BRADDYVILLE, IOWA.—The Continental Gas & Electric Corporation, Omaha, plans to construct a substation here.

DAVENPORT, IOWA.—The Bettendorf Company plans to construct a steam-operated power plant at its local works to cost about $200,000.

FABER, MO.—The Missouri Power & Light Corporation, Mexico, has secured a local franchise and will erect a transmission line to furnish electricity for municipal service. The company is negotiating for a similar franchise at Rush Hill.

KANSAS CITY, MO.—The Federal Power Commission has granted the Central Missouri Power & Water Company a preliminary permit for two power developments on the Gasconade River, in the vicinity of Vienna and Waynesville, having a combined capacity of 56,000 hp.

PALMYRA, MO.—The Council has issued $25,000 in bonds for extensions and improvements to the municipal electric plant and water system.

SALEM, MO.—The Council has arranged for an issue of $5,000 in bonds for a transmission line and distributing system.

TARKIO, MO.—The Western Public Service Company plans to erect a transmission line from Auburn, Neb., to Tarkio. A distributing system will be installed at Brownville, Neb.

SIOUX FALLS, S. D.—The Northern States Power Company contemplates the installation of a 7,500-kw. turbo-generator and accessories. O. A. Rofelty is manager.

SPAULDING, NEB.—The installation of a 100-kva. vertical generating unit in the power plant of the Cedar Valley roller mill is under consideration.

HUTCHINSON, KAN.—Property owners on Fifth Avenue, West, have petitioned the City Council for the installation of an ornamental lighting system on Fifth Avenue from Main to Adams Street.

Southern States

AHOSKIE, N. C.—The Council plans to install a light and power system, for which $15,000 in bonds have been issued.

EASLEY, S. C.—Plans are under way to erect a 9-mile transmission line for the Easley Rural Electric Line, which will require about 27 miles of No. 6 bare copper wire and accessories and 15,000 ft. of No. 8 to No. 10 copper wire, etc. L. M. Bauknight is interested in the project.

AUGUSTA, GA.—Bids will be received by the commanding officer, Augusta Arsenal, until June 27, for electric supplies and wire (Circular 23).

COLUMBUS, GA.—A preliminary permit has been granted the Columbus Electric & Power Company for a power project at Bartlett's Ferry on the Chattahoochee River.

SUMMERVILLE, GA.—The Summerville Cotton Mills plan to equip their plant throughout for electrical operation, including a new extension to be erected. The cost of the entire project is estimated at $300,000.

COCOA, FLA.—The Cocoa Beach Development Company is considering the installation of an electric lighting plant on a tract of land now being developed for residential purposes.

RED BOILING SPRINGS, TENN. — Preparations are being made by the Smith County Electric Company, Carthage, to furnish electrical service here. The company is installing additional machinery at its plant in Carthage to take care of the increased business.

CHATTANOOGA, TENN.—The Tennessee Paper Mills, Inc., plans to install an electric generating station to supply electricity for all departments of its plant.

MARTIN, TENN.—The Kentucky-Tennessee Power Company, which recently purchased the municipal electric plant, is planning to erect high-tension transmission lines to Sharon, Greenfield, Bradford, Dyer, Rives, Obion, Trimble, Dresden and Gleason. Two 500-kw. generators, it is understood, will be installed in the local plant to supply electricity to the above towns. E. O. Wessel, electrical engineer, will have charge of the work.

BIRMINGHAM, ALA. — The Alabama Power Company has petitioned the Public Service Commission for permission to extend its distribution lines to serve the rural districts of Five Points, Gardendale and Eclectic. The company has also applied for permission to extend its distribution line from a point on its Carbon Hill-Brilliant line (about 12 miles) to serve the towns of Guin and Winfield.

ROBERTSDALE, ALA.—The Public Service Commission has granted the Duel Power Company permission to construct an electric plant here.

UNIONTOWN, ALA. — The Alabama Power Company, Birmingham, has acquired the municipal electric plant. The company will extend its transmission lines to Uniontown to furnish electricity to operate the local system.

PARAGOULD, ARK. — The Arkansas Utilities Company, Helena, has purchased the local properties of the Arkansas Light & Power Company, Pine Bluff, consisting of electric system and ice plant.

PINE BLUFF, ARK.—The Arkansas Light & Power Company is reported to have acquired the electric plants of the Arkansas Utilities Company, Helena, at Clarendon, Brinkley, Fordyce, Kingsland and Rison.

LAFAYETTE, LA.—Bids will be received by the City Council until June 24 for two electric alternators, two Diesel engines, switchboard and auxiliary equipment, for the municipal power station. H. R. Podemuller, Lafayette, is supervising engineer.

OAK GROVE, LA.—Bonds to the amount of $45,000 have been voted for a municipal electric plant and waterworks.

FREDERICK, OKLA.—The Southwestern Light & Power Company, Lawton, contemplates erecting a transmission line, 11 miles long, to supply electricity in Frederick.

CLAUDE, TEX.—Bonds to the amount of $35,000 have been voted to complete the municipal electric lighting system.

EAGLE LAKE, TEX.—The Industrial Cotton Mills, Inc., recently organized, plans to build a steam-operated electric plant at its proposed local mills, to cost $350,000. Benjamin H. Faber is architect and engineer.

EL PASO, TEX.—The City Council contemplates the installation of an improved lighting system in the municipal parks.

PORT ARTHUR, TEX.—The Gulf Refining Company contemplates the installation of electric power equipment in connection with extensions to its local oil refining plant, to cost about $2,000,000. Headquarters are in the Frick Annex, Pittsburgh, Pa.

Pacific and Mountain States

ABERDEEN, WASH.—The Grays Harbor Railway & Light Company contemplates building a steam-operated electric plant between Aberdeen and Hoquiam, with initial capacity of about 5,000 kw., to cost about $500,000, with transmission lines, etc. The work will be done by day labor under the direction of Sanderson & Porter, Nevada Bank Building, San Francisco, engineers.

ANACORTES, WASH.—The Puget Sound Power & Light Company, which recently took over the local system, contemplates improvements involving an expenditure of about $100,000, including the erection of a high-tension line from Burlington to Anacortes.

DESTRUCTION ISLAND, WASH.—Bids will be received by the Bureau of Yards and Docks, Navy Department, Washington, D. C., until July 9 for the installation of a radio compass station here (Specification 4954).

SPOKANE, WASH.—The Washington Water Power Company has applied for permission to erect a transmission line (about 6 miles) in the Cœur d'Alene Forest in Shoshone County, Idaho.

ASTORIA, ORE.—The Board of City Commissioners has authorized a call for bids for the installation of a fire-alarm system throughout the city.

BEND, ORE.—The Columbia Valley Power Company has been granted a license by the Federal Power Commission for a hydro-electric project on the Deschutes River in Jefferson County. It is proposed to sell the power developed to public utility companies operating in Portland and immediate vicinity.

KLAMATH FALLS, ORE.—Plans are under way by the California Oregon Power Company for the construction of a hydro-electric power project on the Klamath River at Copco, to cost about $4,000,000.

COTTONWOOD, CAL. — Preliminary plans are under way for the installation of a new street-lighting system on the main thoroughfares.

LODI, CAL.—Stephen E. Kioffer has applied to the Federal Power Commission for a preliminary permit to construct a dam across the Mokolumne River, 20 miles above Lodi, creating a storage reservoir of 180,000 acre-feet capacity, and to divert the river through a channel and conduit to a power house on Jackson Creek, where it is proposed to develop 20,000 hp. A storage reservoir on this tract would restore the water for irrigation purposes.

LOS ANGELES, CAL.—Plans have been prepared for the installation of a fire-alarm box system, to cost about $850,000. J. Griffin is city engineer.

MARYSVILLE, CAL.—The Western Pacific Railroad Company, San Francisco, is preparing plans for the electrification of its local freight yards and other trackage in this section, to cost about $65,000.

OROVILLE, CAL.—The Pacific Gas & Electric Company contemplates improvements to the local street-lighting system, to cost about $35,000.

POINT ST. GEORGE, CAL.—Bids will be received by the Bureau of Yards and Docks, Navy Department, Washington, D. C., until July 9, for the installation of a local radio compass station (Specification 4952).

STOCKTON, CAL.—Bids will be received by Eugene D. Graham, clerk of Board of Supervisors until July 1 for alterations and additions to the power house at the San Joaquin County Hospital.

TURLOCK, CAL.—The Board of City Trustees is considering plans for the installation of an ornamental lighting system on West Main Street and other streets in the western section of the city. Horace Hall is city engineer.

SALT LAKE CITY, UTAH.—Preparations are being made by the Utah Power & Light Company for improvements to its local distribution system, to cost about $100,000.

FLORENCE, ARIZ.—Pinal County Electrical District No. 2 has issued $344,000 in bonds, the proceeds to be used for the construction of a transmission system, transformer stations and other electrical work for irrigation service.

CASPER, WYO.—The City Council is considering an extension of the ornamental lighting system, covering twenty blocks.

COLORADO SPRINGS, COL.—At a special election held recently the proposal to issue $1,250,000 in bonds to build or purchase an electric light plant was approved by the voters.

SILVER CITY, N. M.—The American Aluminum Corporation of New York has been granted a preliminary permit for a power project on Gila River in Grant County.

Canada

EDMONTON, ALTA.—The Provincial Public Utilities Commission has approved the following expenditures: For electric light extensions, $71,700, and for telephone appliances, $20,000.

NELSON, B. C.—The West Kootenay Light & Water Company, Nelson, has applied to the provincial government for permission to store 678,500 ft. of water in Kootenay Lake. If granted, the company proposes to build a dam in the Kootenay River at Granite, submerging the Graham Rapids and raising the lake low water level at Nelson 6 ft.

VANCOUVER, B. C.—The Barnet Lumber Mill Company plans to install electric power equipment in connection with extensions and improvements, to cost about $300,000.

Electrical Patents

Announced by U. S. Patent Office

(Issued May 20, 1924)

1,494,349. TESTING SYSTEM; H. Fletcher, New York, N. Y. App. filed Oct. 19, 1922. For telephone apparatus.

1,494,382. MEANS FOR PREVENTING ELECTRICAL INTERFERENCE; R. B. Shank, Flushing, N. Y. App. filed May 27, 1921. Between signaling circuits.

1,494,397. BATTERY-CHARGING APPARATUS; G. Wheat, Marlboro, Mass. App. filed Aug. 6, 1919. Particularly for light portable batteries carried by miners.

1,494,401, 1,494,402. MOTOR-CONTROL SYSTEM; L. M. Aspinwall, Pittsburgh, Pa. App. filed Sept. 23, 1921. To govern the motors of a trackless trolley or other vehicle that is provided with a plurality of current-collecting devices.

1,494,404. ANTI-THEFT DEVICE FOR METERS; C. S. Bailey, Ashland, Pa. App. filed Aug. 3, 1921.

1,494,412. OUTLET BOX; J. C. Boyton, Cleveland, Ohio. App. filed March 13, 1920.

1,494,449. STRAIN INSULATOR; L. Steinberger, Brooklyn, N. Y. App. filed April 9, 1920.

1,494,463. ELECTRIC FLATIRON; C. A. Cook, Chicago, Ill. App. filed Oct. 30, 1922. With automatic switching means.

1,494,526. DIRECTION INDICATOR; L. A. Altieri, San Francisco, Cal. App. filed Jan. 4, 1922. For vehicles.

1,494,551. HUMIDITY REGULATOR; J. Johnston, New Haven, Conn. App. filed Dec. 10, 1921.

1,494,555. TELEPHONE SYSTEM; E. W. Lincoln, Chicago, Ill. App. filed May 6, 1921. Private-branch exchange system.

1,494,574. STAND LAMP; R. B. Benjamin, Chicago, Ill. App. filed Jan. 16, 1920. Cluster type.

1,494,593. MOTION-PICTURE FILM-MAKING DEVICE; O. B. Deque, Chicago, Ill. App. filed Feb. 6, 1922. To indicate the points at which the film is to be severed for the purpose of more conveniently developing it.

1,494,625. BATTERY INDICATOR; A. S. Pierce, Peoria, Ill. App. filed June 23, 1920. For indicating evaporation or condition of charge or discharge of the electrolyte.

1,494,629. AUTOMATIC POWER AND LIGHT SYSTEM; C. E. Reddig, Kew Gardens, N. Y. App. filed Nov. 26, 1921. Control system.

1,494,654. ELECTRIC HEATER; W. W. Weir, Alameda, Cal. App. filed April 11, 1923. "Fire place" and portable types.

1,494,656. ELECTRICAL BURGLAR ALARM; R. F. Wherland, Minneapolis, Minn. App. filed Oct. 20, 1921.

1,494,659. CLAMPING MECHANISM FOR WELDERS; A. W. Woodward, Akron, Ohio. App. filed April 17, 1920.

1,494,663. TRAFFIC SIGNAL; W. M. Bucher, Los Angeles, Cal. App. filed Jan. 18, 1921. Automatically controlled.

1,494,690. ELECTRIC WIRE CONNECTING DEVICE; E. Lacy, Richwood, N. J. App. filed Sept. 20, 1920. For clamping electric conduit to boxes.

1,494,713. ELECTRIC SEAM-WELDING MACHINE; G. H. Schkommodau, Lynn, Mass. App. filed Nov. 29, 1918. In which the seam is brought to the requisite welding temperature by means of its resistance to the passage of an electric current of high amperage and low voltage through or across it.

1,494,715. COOLING OF ELECTRICAL APPARATUS; G. Schroeder, Hale, England. App. filed March 11, 1921. By removing heat from cores which are the seat of fluxes which undergo relatively rapid changes either in quantity or position, particularly alternating-current machines.

1,494,733. MAGNETO TESTING AND RECHARGING DEVICE; C. Carpenter and E. Green, Haviland, Kan. App. filed June 8, 1922. Permanent magnets may be tested and recharged if necessary.

1,494,743. TRAFFIC SIGNAL; G. W. Horton and E. L. Peterson, Worcester, Mass. App. filed Nov. 14, 1921.

1,494,744. CONDENSER FOR IGNITION APPARATUS; E. Hurlimann, Zuchwil, and F. Billon and J. Bohli, Solothurn, Obach, Switzerland. App. filed Oct. 18, 1919.

1,494,770. METHOD AND APPARATUS FOR INDICATING THE GEOGRAPHICAL LOCATION OR MOVEMENT OF BODIES; W. W. Conners, Elizabeth, N. J. App. filed June 12, 1919.

1,494,803. ELECTRICAL TUNING; M. I. Pupin, Norfolk, Conn. App. filed Sept. 17, 1915. For radio apparatus.

1,494,811. ART OF REPRODUCING PIANO PLAYING; H. K. Sandell, Chicago, Ill. App. filed June 14, 1922.

1,494,826. RADIUM APPLICATOR; C. H. Viol, Pittsburgh, Pa. App. filed Sept. 29, 1920. Of the needle type.

1,494,842. TIDAL WATER-POWER PLANT; A Huguenin, Zurich, Switzerland. App. filed June 8, 1923.

1,494,866. INTER-OFFICE TELEPHONE SYSTEM; W. T. Powell, Rochester, N. Y. App. filed April 4, 1921. Employing automatic switches.

1,494,878. TELEPHONE SYSTEM; W. P. Andrick, Hohokus, N. J. App. filed March 18, 1922. Wherein one of a plurality of telephone substations may be connected to a common line to the exclusion of other stations.

1,494,905. MODULATOR CONTROL; R. V. L. Hartley, East Orange, N. J. App. filed Sept. 29, 1919. For radio apparatus.

1,494,908. AMPLIFICATION OF MODULATED WAVES; R. A. Heising, Millburn, N. J. App. filed Feb. 23, 1923. In carrier-current radio apparatus.

1,494,912. HEATING DEVICE; S. Hnevkovsky, Prague, Czechoslovakia. App. filed July 21, 1921. Grill type.

1,494,924. TELEPHONE-EXCHANGE SYSTEM; A. E. Lundell, New York, N. Y. App. filed Nov. 8, 1920. Automatic.

1,494,935. ALTERNATING-CURRENT SOURCE; E. O. Scriven, New York, N. Y. App. filed July 16, 1918. Of the electron discharge type.

1,494,936, 1,494,937, 1,4494,938, 1,494,939. ELECTRIC HEATER; C. C. Abbott, Pittsfield, Mass. App. filed Oct. 5, 1921. For steam boilers, etc.; particularly adapted for use on high-voltage circuits.

1,494,940. ELECTRIC HEATING UNIT; C. C. Abbott, Pittsfield, Mass. App. filed Oct. 17, 1922. Sheath-wire unit.

1,494,945. CURRENT INTERRUPTER; C. E. Bennett, Atlanta, Ga. App. filed May 18, 1920. For automatically interrupting a protective ground connection associated with a power line.

1,494,954. BATTERY TERMINAL; W. F. Crouch, Seattle, Wash. App. filed Jan. 12, 1921.

1,495,017. CONNECTING MEMBER; O. Gentsch, Magdeburg, Germany. App. filed July 25, 1921. For establishing electrical contact between two leads.

1,495,030. ALTERNATING-CURRENT MACHINE; P. Muller, Berlin, Germany. App. filed Aug. 29, 1921. For frequency transformation or generation of two currents of different frequency.

1,495,045. ELECTRICALLY HEATED DEVICE; W. A. Rankin, Chicago, Ill. App. filed Dec. 18, 1920. Such as ovens with the operation rendered automatic.

1,495,059. INTER-OFFICE TRUNK CIRCUITS FOR TELEPHONE SYSTEMS; B. D. Willis, Oak Park, Ill. App. filed June 18, 1920.

1,495,060. MAGNETIC INDUCTOR; J. M. Wilson, Newark, N. J. App. filed Sept. 1, 1917.

1,495,112. ELECTRIC TIME SWITCH; F. Sauter, Basel, Switzerland. App. filed March 23, 1920.

(Issued May 27, 1924)

15,845 (reissue). CLAMPING EAR; G. W. Bower, Schenectady, N. Y. App. filed Oct. 19, 1920. As used for trolley-line construction.

15,846 (reissue). ELECTRIC BATTERY; H. F. French, Fremont, Ohio. App. filed July 27, 1915. In which the reacting elements are kept separated until the batteries are to be put in action.

1,495,153. SEPARABLE ATTACHMENT FIXTURE; R. B. Benjamin, Chicago, Ill. App. filed March 31, 1920.

1,495,199. HEAT REGULATOR; F. J. Porwoll, St. Cloud, Minn. App. filed July 23, 1921. For governing the temperature of sadirons.

1,495,203. BRUSH HOLDER; P. Roberg, Brooklyn, N. Y. App. filed July 11, 1923. Perpendicular-box type.

1,495,204. AUTOMOBILE SIGNAL EXHIBITOR; F. C. Roberts, Detroit, Mich. App. filed July 29, 1921.

1,495,221. MEANS FOR AND METHOD OF CONTROLLING TRANSMISSION; A. B. Clark, Brooklyn, N. Y. App. filed April 30, 1918. Where circuits employ so-called four-wire repeaters.

1,495,226. DETECTING CIRCUITS; B. P. Hamilton, Brooklyn, N. Y. App. filed July 3, 1920. For receiving in connection with a system in which carrier currents are employed.

1,495,236. PERIODICALLY - VARYING - FREQUENCY MOTOR-GENERATOR SET; J. L. Adam, Jr., Milwaukee, Wis. App. filed Nov. 17, 1919.

1,495,272. PROCESS AND APPARATUS FOR ARC WELDING; R. Stresau, Wauwatosa, Wis. App. filed July 17, 1920.